ENVIRONMENTAL ASSESSMENT

Plentywater Creek Project

OR-086-01-01

November 27, 2001

USDI Bureau of Land Management
Oregon State Office
Salem District
Tillamook Resource Area
Washington and Multnomah Counties, Oregon

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CHAPTER 1.0 PROJECT SCOPE

For the reader=s convenience, terms defined in the Glossary (chapter 6.0) are shown in ***bold italics*** the first time they appear within the text of this Environmental Assessment.

1.1 Project Location

The project area is located approximately 12 miles north of Hillsboro and Forest Grove, Oregon, in Washington and Multnomah Counties on forested lands managed by the Tillamook Resource Area, Salem District, BLM (Bureau of Land Management). The project area lies within the Dairy-McKay Creek and Rock Creek watersheds, both tributaries to the Tualatin River. Forest Management projects are proposed in Township 2 North, Range 2 West sections 7, 15, 17, 21 and Township 2 North, Range 3 West sections 3, 9 and Township 3 North, Range 3 West sections 21, 27, 29, and 33. The proposed fish habitat enhancement would occur along Dairy Creek within Township 3 North, Range 3 West section 21, Willamette Meridian (Figure 1).

The project area is within the ***Matrix (GFMA/Matrix)*** and ***Riparian Reserves (RR)***, as identified in the RMP (Salem District Record of Decision and Resource Management Plan), dated May, 1995. These lands are ***O&C (Oregon and California Railroad) revested lands***.

The project area falls within the ***ESU (Evolutionarily Significant Unit)*** (a distinct population segment) of upper Willamette steelhead and chinook salmon which are Federally listed species. The area is also designated critical habitat for both species.

The project area is <u>not</u> located within designated critical habitat for the marbled murrelet or Northern spotted owl nor is a RPA (Reserve Pair Area) or a Core area for the Northern spotted owl. The area is not within a key watershed either.

1.2 Background

In the spring of 1997 portions of the McKay Creek watershed were visited by BLM staff specialists representing Timber Management and Wildlife. The result of this visit was the proposed ASoleberger@ timber sale. The ASoleberger" project was not carried forward beyond the initial proposal. In September 1999, BLM staff specialists representing Wildlife and Silviculture revisited the ASoleberger" project and reviewed the existing data. These specialists then conducted field reviews of the previously proposed area as well as numerous additional sites within the McKay Creek and Rock Creek watersheds to: 1/ identify resource conditions that did not meet the management objectives contained in the RMP, for the Matrix and RR and 2/ develop possible management actions that would contribute to the achievement of some of the long-term management direction. The result of the 1999 exercise was then proposed for management action, again using the "Soleberger" title.

In the summer through winter of 1999, a watershed level activity planning exercise was conducted within the East Fork of Dairy Creek watershed. This activity planning exercise was conducted to assess all BLM lands in the watershed to 1/ identify resource conditions that did not meet the management objectives contained in the RMP, for the Matrix and RR and 2/ develop possible management actions that would contribute to the achievement of some of the long-term management direction.

On March 31, 2000, the Tillamook Field Manager reviewed the Soleberger timber sale and the list of possible management actions identified in the Mid-Diary Activity Plan. The Tillamook Field Manager selected a list of projects to move forward with, and decided to consolidated the projects into one watershed level analysis project from which he could issued multiple resource management decisions. The project which was titled "Plentywater Creek Project@ contains those actions, hereafter referred to as the proposed action, and described in detail in Chapter 1.4. On June 21, 2000, the Tillamook Field Manager directed an ***IDT* (*interdisciplinary team)*** to conduct an ***environmental analysis*** of the proposed action in accordance with the ***NEPA* (*National Environmental Policy Act*)**. That environmental analysis is documented in this ***EA* (*environmental assessment*)**.

This EA is intended to provide the Tillamook Field Manager sufficient information for reaching an informed decision and issue multiple decisions determining whether an action(s) may have significant environmental effects. Decisions resulting from this analysis could result in up to three timber sale actions as well as non-timber related projects consisting of wildlife habitat enhancement, fish habitat enhancement, campground/soil restoration and road stabilization. Should the selected action(s) have significant environmental effects, an ***EIS (environmental impact statement***) will be prepared. If the selected action(s) do not have significant environmental effects, a ***finding of no significant impact*** will be prepared for the project as a whole from which multiple decisions will be issued.

1.3 Purpose of and Need for Action

1.3.1 Forest Management on Matrix and RR lands

Regeneration harvest

Project map units 9-1, 21-2, 21-3, 33-1 and portions of 15-1 and 21-1 totaling approximately 240 acres.

The stands located by project map units 9-1, 21-2, 21-3, 33-1 and portions of 21-1 and 15-1 are variable, ranging from poorly stocked Douglas-fir and Cedar to total hardwood domination. These stands are generally 50 - 60 years old, however unit 9-1 contains a few 100 year old individuals. The stands in project map units 3-1 and 3-2 are comprised of 70 year old mixed conifer and hardwood stands. Conifer stocking is low and is being affected by the presence of

the root disease fungi PW (*Phellinus weirii*) (See Appendix 1 p 2 for a description of the PW fungus). Generally crown closures in these stands range from 78% to 95%, with little or no understory conifer regeneration. Herb and shrub cover ranges from 90% to 100% of the ground surface. Generally all of the stands are deficient in ***snags*** and the levels of ***CWD*** (***coarse woody debris***) appear rather low. Project map units 15-1 and 21-2 contain areas with high concentrations of English Ivy and Scotch Broom is found in units 21-1, 21-2 and 15-1.

The desired condition for these stands is one in which the spread of PW is decreased; hardwood dominated areas are returned to conifer domination; the spread and presence of English Ivy and Scotch Broom is reduced; snag and CWD levels are increased; and the ability to produce timber over the long term is enhanced (RMP p 46 - 47). As such, it is proposed to treat these areas with regeneration harvest and reforest hardwood stands with conifer species such as Douglas-fir, grand fir, western hemlock and western redcedar, and reforest PW infected areas with disease resistant species such as western redcedar and various hardwoods.

Commercial thinning

Project map units 29-1, 27-1, 3-3, 7-1, 17-1, and portions of units 21-1 and 15-1 totaling approximately 300 acres

The stands dominating project map units 7-1, 3-3, 17-1 and portions of Units 21-1 and 15-1 totaling 236 acres are comprised of densely stocked 50 - 60 year old Douglas-fir. The stands in map unit 7-1 contains a number of large residual old-growth trees which are scattered throughout the area. The stand dominating project map unit 29-1 is comprised of densely stocked 30 year old Douglas-fir. Aerial surveys conducted in the 1980's combined with recent site evaluations indicate that this area is generally free from sever infection with the root disease fungi PW. One exception is an area in project map unit 27-1 which is severely infected. Crown closure in these stands is approximately 80%. Generally understory tree regeneration is poor and shrub and forb coverage ranges from approximately 90% - 100% of the ground surface.

Generally all of the stands are deficient in snags and the levels of CWD appear rather low.

The desired condition for these stands is one in which treated stands have an improvement in general stand health and vigor resulting in increased diameter growth, crown development and windfirmness. This would help in producing a sustainable supply of timber and provide connectivity and habitat for a variety of organisms.

Riparian Reserves

The Salem RMP (p. 7) directs us to Aapply silvicultural treatments to restore large conifers in RR.@ It goes on (p. 24) and directs us to Adesign and implement wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of Aquatic Conservation Strategy Objectives.@ The WA (Dairy-McKay Watershed Analysis) (March 1999) identifies (p. 14) that ARiparian habitat has become degraded in many parts of the watershed@ and is lacking in

LWD (Large woody debris) and it may be beneficial to the ecosystem health and function, and attainment of the ***ACS (Aquatic Conservation Strategy) Objectives*** to conduct thinnings within RR to encourage rapid tree growth and enhance the development of some late seral stage habitat conditions. In addition high amounts of windthrow frequently occurs in stands adjacent to units being regeneration harvested. Thinning allows trees to develop larger crowns, larger diameters and greater windfirmness.

The RR stands in the project area are similar in structure to the adjacent Matrix stands. The desired condition for these RR stands is one in which there is a greater diversity of later seral stage habitats and LWD to meet ACS objectives as well as a decreased potential for windthrow adjacent to Matrix lands.

Roads Management
(Roads throughout the proposed project area)

The WA indicates that there are 31.27 miles of road on the BLM lands within this watershed (p. 68). The WA continues (p.114) that a number of potential strategies exist to address road-related problems on BLM lands such as decommissioning roads that are no longer needed.

The desired condition is one in which implementing forest management projects result in no net gain in road mileage within in the watershed in the long-term, and if possible results in a net decrease in road mileage.

BLM road 3N-3-33, the primary access to Unit 33-1 was severely damaged in the 1996 flood event. Currently legal access is being sought to secure an alternate route to Unit 33-1. If alternate access can not be attained prior to implementation of treatment to Unit 33-1, road 3N-3-33 would be rebuilt as a part of this timber sale action. If alternate access can be attained, road 3N-3-33 would be stabilized as described under section 1.3.2 of this EA.

1.3.2 Watershed Restoration Projects on Matrix and RR lands

Fish Habitat Enhancement: The RMP specifies (p. 27) that "As identified through watershed analysis, rehabilitate streams and other waters to enhance natural populations of anadromous and resident fish.@

Data collected on Dairy Creek in 1995 by Oregon Department of Fish and Wildlife noted a general lack of pools, large wood volume, and riparian conifers greater than 20 inches ***DBH*** (***diameter at breast height***). In addition, during the winter floods of 1996 changes were effected to BLM administered in-stream habitat within East Fork Diary Creek in an unauthorized effort to prevent the loss of some private property, as well as several bridges on the Dairy Creek Road. The result of these changes were the loss of beneficial structure and diminished habitat quality for anadromous and resident fish populations on a BLM administered segment of the East Fork Dairy Creek above Greener Road (WA p 50).

The desired in-stream condition is one in which fisheries habitat is improved on BLM administered stream segments. Specifically, streams have a greater amount of large wood within them for increased number and quality of pools, and more large diameter riparian conifers to provide a long-term supply of large wood for input to the stream system.

Wildlife Habitat Enhancement: The RMP specifies that one of the objectives of Matrix lands is to Aprovide habitat for a variety of organisms associated with both late successional and younger forests. The WA indicates (p. 14) that Amost vegetation in the Dairy-McKay watershed is predominantly in early and mid-successional seral stages, and [is] structurally quite fragmented.@ The WA goes on to state that (p. 92) ABLM lands in the Dairy-McKay Creek watershed likely have low levels of snags and down wood.@

The desired condition is one in which some late-successional characteristics such as structural diversity snags and CWD are increased across the landscape in the watershed.

Campground Restoration[1]: The RMP (p. 23) directs us to comply with state water quality requirements to restore and maintain water quality and to meet the ACS objectives. Several ACS objectives relate to restoration of shorelines and banks, restoring flood plain inundation and restoring structure and diversity to riparian plant communities. On the floodplain for the East Fork Dairy Creek above Greener road there is a historical campground, known as Little Bend, which was formally closed in the 1980s. The floodplain where the former campground is located is severely compacted. No riparian vegetation can grow and the flood plain is not properly functioning due to limited water infiltration capacity.

The desired condition is one in which the soil is decompacted and riparian vegetation is restored.

Road Stabilization: The RMP (p. 11) specifies to help meet ACS objectives by closing and stabilizing roads while considering short-term and long-term transportation needs. During the 1996 flood event BLM road 3N-3-33 was severely damaged. This road continues to contribute sediment to the East Fork Diary Creek.

The desired condition is one in which the road damage is stabilized and sediment from the area is reduced.

1.3.3 Project Objectives

By comparing the existing conditions of the landscape in and around the project area to the

[1]The campground restoration project initially included permanent capping of a water well within the former “Little Bend” campground area. Emergency funding became available for accomplishing this project through the recreation program. Therefore, the well capping portion of this proposed action was eliminated from this environmental analysis process. Rather, the analysis was conducted under categorical exclusion number OR-086-01-01CX which is available for review at the Tillamook Field Office.

objectives for the Matrix and RR land allocations described within RMP, the IDT identified a number of specific resource conditions that do not meet the long-term management objectives.

The project objectives are to modify these conditions, and to move toward achieving the objectives described within the RMP, pages 5-6, 9, 11, 20, 22, 24 and 27. These objectives include:

1. Accomplish the objectives for Matrix lands identified on page 20 of the RMP;
2. Retain CWD already on the ground and protect it to the greatest extent possible from disturbance during treatment which might otherwise destroy the integrity of the substrate. (RMP p 21);
3. Minimize soil and litter disturbance (RMP p 20);
4. Accomplish ACS objectives (RMP pp 5-6);
5. Rehabilitate and protect at-risk fish stocks and their habitat (RMP p 27);
6. Enhance and maintain biological diversity and ecosystem health in order to contribute to healthy wildlife populations (RMP p 24);
7. Restore flood plain function;
8. Correct problems associated with high road density by emphasizing the reduction of minor collector and local road densities where such problems exist (RMP p 62).

1.4 Proposed Action

The BLM proposes to conduct commercial thinning operations on approximately 300 acres, regeneration harvest on approximately 240 acres, enhance wildlife habitat value throughout the watershed by thinning RR adjacent to Matrix harvest units, improve fish habitat quality in approximately 1 mile of the East Fork of Dairy Creek, restore watershed function and riparian vegetation on approximately 2 acres along the East Fork Diary Creek, stabilize a road damaged in the 1996 floods and ***decommission*** approximately 14,600 feet of existing permanent and future semi-permanent road. The proposed action was specifically designed to achieve the objectives listed in Chapter 1.3.3 (Project Objectives). A detailed description of the proposed action under analysis in this document is contained in Chapter 2.2.2 (Alternative 2).

1.5 Decisions to be Made

Dana Shuford, Tillamook Field Manager, is the official responsible for deciding whether or not to prepare an EIS, and whether to approve the individual commercial thinning, regeneration harvest, watershed restoration and road decommissioning projects as proposed, not at all, or to some other extent. The intent is to issue multiple decisions for a number of individual projects, as described in Section 1.2 and analyzed in this EA.

1.6 Issues and Units of Measure

In compliance with NEPA, the proposed action was listed in the June, September, and December 2000 and March 2001 editions of the quarterly *Salem District Project Update* which was mailed to over 1,000 addresses, and a letter and scoping report (Project Record document 51) was mailed on July 26, 2000 to 124 potentially affected and/or interested individuals, groups, and agencies (Project Record document 51). A total of 10 letters were received as a result of this scoping effort. All public input was assigned a number and filed within the Project Record (Project Record documents 39, 52-55, 58, 62-65). The IDT reviewed, clarified, and addressed the public comments. The disposition of those comments are contained in Appendix 2. Subsequent to the previously described scoping period, a public meeting was held on January 29, 2001 which provided an open exchange of information between meeting participants and the BLM.

Comments received during that meeting were reviewed by the IDT to determine whether any additional issues were identified. Those comments and BLM=s responses are also located in Appendix 2.

Considering public comment, the IDT identified two major issues, Soil/Water and Rural Interface, which will be the focus of this environmental analysis. Chapter 3 will also contain a discussion of the other three standard elements of the environment (i.e., vegetation, wildlife, and fisheries) which were not identified as major issues but are subject to environmental analysis. Additionally, the major issues and the other standard elements of the environment are associated

with a specific unit of measure. The units of measure were selected to evaluate issue resolution (i.e., Soil/Water and Rural Interface issues), evaluate attainment of project objectives and/or describe environmental impacts.

1.6.1 Vegetation

Vegetation resources have been divided into three categories to facilitate analysis. These categories include special status species, noxious weeds, and forest vegetation (within RR and Matrix land use allocations). The unit of measure is a narrative and/or acres treated.

1.6.2 Wildlife

The unit of measure selected for each wildlife species listed or proposed under the ESA (Endangered Species Act), and their designated critical habitat, is a narrative that describes whether or not there would be: (a) no effect, (b) may affect, beneficial, (c) may affect, is not likely to adversely affect, or (d) may affect, is likely to adversely affect. The unit of measure selected for wildlife species included in the Special Status Species policy covered under BLM Manual 6840 is a narrative that describes whether or not there would be a trend toward federal listing or loss of population viability. The unit of measure selected for other wildlife species of concern is a narrative.

1.6.3 Fisheries

The unit of measure selected for fish species listed under the ESA, and their designated critical habitat, is a narrative that describes whether or not there would be: (a) no effect, (b) may affect, is not likely to adversely affect, or (c) may affect, is likely to adversely affect. An additional unit of measure is consistency with ACS objectives. The unit of measure selected for fish species included in the Special Status Species policy covered under BLM Manual 6840 is a narrative that describes whether or not there would be a trend toward federal listing or loss of population viability.

The unit of measure for ***EFH*** (***Essential Fish Habitat***) as described in the ***MSA*** (***Magnuson-Stevens Act***) will be a call of "May Adversely Affect" or "No Adverse Affect" for the Upper Willamette Coho and the Upper Willamette Chinook.

1.6.4 Soil and Water – Major Issue (major issue; defines the scope of environmental concern for the proposed action and is used to formulate the alternatives contained in Chapter 2)

The proposed action (e.g., primarily the use of ground-based equipment, the construction of ***roads*** and thinning of stands on steep slopes) would result in soil disturbance/compaction and increased risk of land instability which may increase sedimentation, decrease soil productivity,

and may have short- and long-term impacts on hydrology.

The unit of measures selected include: acres of ***soil disturbance***; acres of very steep slope (70%+) treatment areas and a narrative of the effects of the action on water quality, soil productivity and hydrology.

1.6.5 Rural Interface – Major Issue (major issue; defines the scope of environmental concern for the proposed action and is used to formulate the alternatives contained in Chapter 2)

Six comments were received relating to the proposed action within the Rural Interface Area of Section 21, T2N R2W WM. Four concerns were raised: 1) Potential dust generation from log hauling on Solberger Road which is a gravel surfaced County road; 2) Potential dumping on semi-permanent roads built to support harvest operations; 3) Potential damage to the Solberger Road resulting from harvest related traffic; and 4) Increased criminal activity resulting from increased visibility from Solberger Road. Alternative 4 was developed to address these issues. The unit of measure is a narrative discussing each of the concerns.

CHAPTER 2.0: ALTERNATIVES

2.1 Alternative Development

In addition to the required Ano action@ alternative, the IDT formulated six alternatives to the proposed action which would address the major issues raised during scoping. The IDT assessed those preliminary alternatives and dropped two of them from detailed analysis. The finalized list of alternatives to the proposed action includes a Ano action@ alternative and two action alternatives (i.e. Alternative 3 - Soil and Water, and Alternative 4 - Rural Interface) that address the major issues (Soil and Water and Rural Interface) and wholly or partially fulfill the purpose and need for action (Chapter 1). The proposed action includes a watershed restoration element that remains consistent throughout the 3 action alternatives. Therefore, there are two alternatives for Watershed Restoration; the Ano action@ (Alternative 1, and the Aproposed action@ (Alternative 2).

2.2 Alternatives Dropped From Detailed Analysis

The following potential alternatives to the Proposed Action were dropped from detailed study because they were determined not to resolve the identified major issues for the reasons described below:

1. Helicopter logging - This logging method was dropped from detailed analysis for the following reasons; 1) Under the Proposed Action there are 11 acres of ground in the watershed, within thinning units, that would not be sub-soiled following completion of harvest activity. Due to the dispersed nature of these areas there would be several landing and helicopter support areas would be required which would result in greater than 11 acres of soil disturbance; 2) Helicopter logging would not reduce road mileage; 3) Under Alternative 3 the soil disturbance resulting from project actions would be minimized as much as feasibly practical and still partially or fully meets the project objectives; and 4) We do not believe it would be safe to operate a helicopter in the timber sale project areas due to the presence of rural homes and powerlines.

2. Horse Logging - Horse logging was requested in several public comments for operations within the Rural Interface Area. Horses may reduce skidding related dust in the Rural Interface Area, but it would not be a notable reduction from what skidders would produce. Also, horse logging would not address the primary dust production concern raised in comments, which was dust produced while hauling logs on gravel surfaced county roads.

2.3 Description of Alternatives

(NOTE: The design features contained in each of the alternatives are provided for impact analysis purposes and are assumed to be implemented in the majority of the project area. Some of the design features may be modified during the layout phase of the project should actual on-the-ground conditions warrant, and if determined by the responsible official to be consistent with the Project Objectives identified within Chapter 1.3.3 and within the scope of the analysis contained in Chapter 3. As appropriate, changes to the design features during the layout phase will be tracked and documented in the Project Record in order to demonstrate they are consistent with project objectives and within the scope of the analysis.)

All of the action alternatives would implement the appropriate BMPs (Best Management Practices) which are contained in Appendix C1 through C11 of the RMP as amended.

Timber harvest BMPs for cable yarding areas are:

1. On areas with high water tables, yard with full suspension or with one-end suspension on seasonally dry soils.On areas with slopes exceeding 65 percent, yard with full suspension, one-end suspension using seasonal restrictions, or one-end suspension using a standing skyline with lateral yarding capacity. Yard remaining areas using one-end suspension.
2. Pile yarding debris on the landing to minimize the acreage around the landing impacted by intense burns or obstructed by heavy slash concentrations.
3. Hand water bar cable yarding corridors immediately after use on sensitive soils where gouging occurs.
4. When absolutely necessary to yard through riparian areas, restrict yarding in riparian areas to corridors that are perpendicular to streams. Management guidelines for corridors are:
    a. Restrict corridors to the minimum number feasible.
    b. Corridors will not exceed 50 feet in width nor reduce crown cover on a project stream segment to less than 75 percent of predisturbance conditions.
    c. Logs will be fully suspended over water and adjacent banks.

Timber harvest BMPs for ground based yarding areas are:

1. Use existing skid roads wherever possible.
2. Limit new skid roads to slopes less than 35 percent.
3. Use designated skid roads to limit areal extent of skid roads plus landings to less than 10 percent of the unit.
4. Restrict tractor operations to designated roads and limit operations to periods of low soil moisture, when soils have the most resistance to compaction (dry season).
5. In partial cut areas, locate skid roads were they can be used for regeneration harvest.
6. Till compacted roads, including skid roads from previous entries, with a properly designed self-drafting winged subsoiler.
7. Avoid tractor yarding on areas where soil damage cannot be mitigated.
8. Avoid placement of skid roads through areas of high water tables or where the skid roads would channel water into unstable headwall areas.

9. Water bar skid roads whenever surface erosion is likely.
10. Avoid use of wide track vehicles or more than one machine on a skid road at any given time to minimize the width of the skid roads. On multiple pass skid roads, wide track vehicles create in wider skid roads, and after multiple passes, drive the compaction deeper than a regular width track. However, they are good for one pass operations such as incidental scattered salvage or site preparation.
11. If timber harvesting activities will produce slash that covers the existing skid roads so they cannot be relocated, till prior to felling timber with a properly designed winged subsoiler.

2.3.1 Alternative 1 (No Action)

For this EA the no action alternative is defined as not implementing any of the proposed forest management or other projects in the Plentywater Creek Project area contained in Alternatives 2, 3 and 4. There would be no commercial thinning, regeneration harvest, new road construction, reconstruction of existing roads, road decommissioning (including culvert removal), fish habitat and flood plain restoration, wildlife habitat enhancement or road stabilization at this time. The local plant and animal communities would be dependent on and respond to ecological processes that would continue to occur based on the existing condition.

The No Action alternative would serve to set the environmental baseline for comparing effects of the action alternatives

2.3.2 Alternative 2 (Proposed Action)

The proposed action is comprised of two separate groups of projects, Group 2.3.2.1 Forest Management on Matrix and RR lands and Group 2.3.2.2 Watershed Restoration projects on Matrix and RR lands.

2.3.2.1 Forest Management in Matrix and RR lands

The proposed action is to implement several timber sales using combinations of commercial thinning and regeneration harvest prescriptions. Appendix 1 “Silvicultural Prescription,” contains specific information about the proposed stand treatments and site preparation including the use of fire. It would include timber harvest on approximately 544 acres within the Matrix land use allocation, and approximately 37 acres of thinning within the RR land use allocation. Approximately 210 acres of the harvest would be accomplished by utilizing cable logging systems and 335 acres would be accomplished utilizing ground-based systems. The units and logging systems described within the Proposed Action are depicted on Figure 2 – “Map of Units and Logging Systems for Alternative 2.” Regeneration harvest prescriptions would be applied where there is a high incidence of PW, hardwoods, or low density stocking of conifer species. Commercial thinning would be applied where conifer growth and/or wildlife habitat value could be enhanced by the treatment. The regeneration areas would be reforested using an appropriate

mix of native conifer species and/or hardwoods for the site. The projects are expected to be implemented (sold) during FY 2002 and result in the production of an estimated 8 ***MMBF*** (million board feet) of commercial timber products (see Table 1).

As proposed, specific design features, in addition to those specified in the BMPs listed under section 2.3, of the project would help meet the management objectives contained within the RMP and are in compliance with the standards and guidelines contained within the Northwest Forest Plan. These design features are as follows:

Common to all units:

1. Following harvest, all skid trails within the regeneration harvest units which are determined by the hydrologist to be affecting the hydrologic function of the watershed would be decommissioned by decompacting the trail surface (subsoiling) and if needed, water-barring and blocking to vehicular traffic.
2. Within the thinning units skid trails would not be subsoiled to avoid damaging the roots of reserve trees however if necessary, they may be blocked and/or water-barred.
3. Ground based equipment would not be allowed within RR except where they are able to operate from existing permanent roads located within the RR.
4. Depending on the individual site specific fuels prescription, property boundaries, RR, sensitive sites containing Special Status or Survey and Manage vascular plant, fungi or mollusks, and green retention tree clumps greater than 1 acre in size would be fire trailed for maximum protection from ground fire.

Unit 27-1

1. Where cable corridors pass through the RR area, corridor width would be limited to 12 feet.
2. Where it is necessary to yard across Plentywater Creek and through the RR, full suspension would be required over Plentywater Creek and the adjacent 50 foot Ano cut@ buffers on each side of Plentywater Creek.
3. The trees which would be cut for cable corridor construction within the 50 foot Ano cut@ buffers would be felled into Plentywater Creek (if possible) to supplement LWD. If the they cannot be felled directly into Plentywater Creek, they would be maintained on-site as CWD.

Unit 21-2, 21-3 and 15-1 (Rural Interface areas)

1. A visual buffer 50 - 75 feet in width would be retained where Solberger Road passes through Unit 21-2.
2. Scotch broom would be cut and/or pulled one year prior to commencement of harvest activity. Following completion of harvest for a period of three to five years reduce seed production and spread by cutting and/or hand pulling all mature plants having the ability to reproduce.
3. Infestations of English Ivy would be treated to eliminate or reduce their presence. Treatment would consist of cutting and/or hand pulling ground cover for a minimum of

one year prior to commencement of harvest activity. Following completion of harvest for a period of three to five years reduce seed production and spread by cutting and/or hand pulling all mature plants having the ability to reproduce.

4. The use of compression brakes would be prohibited.
5. The tall bugbane (*Cimicifuga elata*) site would be protected with a 50 foot buffer.

Unit 17-1

1. Areas gouged on erosion prone steep slopes would be hand water barred.
2. The unstable area in the northwest corner of the unit would not be logged.
3. Waddles would be placed in the swale above the ditch adjacent to BLM road 2N-2-18.
4. The spur road intersecting BLM road 2N-2-18 would be used and decommissioned in one season. Spur decommissioning would include slope recontouring of the road segment located within the RR.

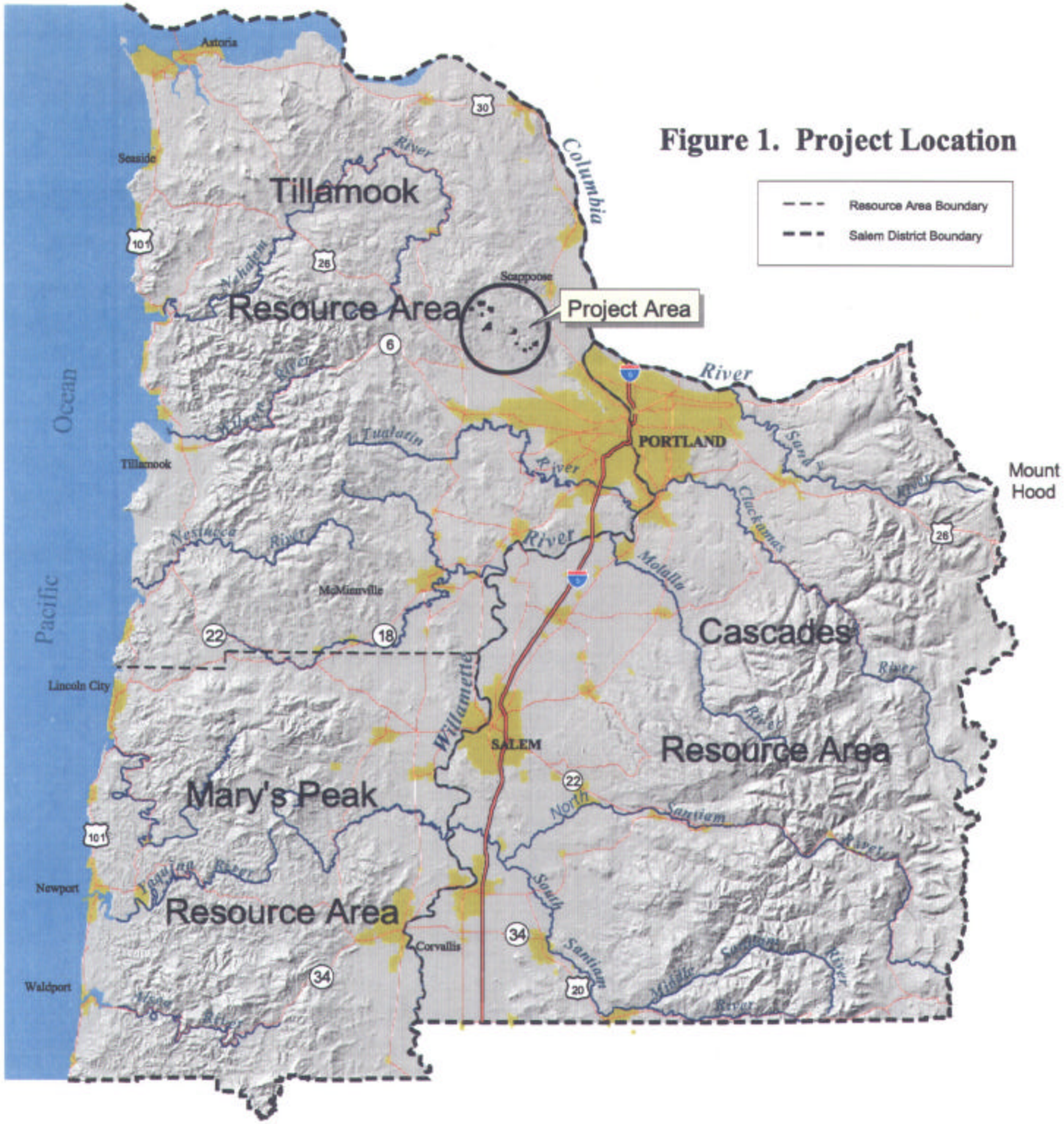
Figure 1. Project Location
Resource Area Boundary
Salem District Boundary
Project Area
Tillamook
Resource Area
Cascades
Resource Area
Mary's Peak
Resource Area
PORTLAND
SALEM
Astoria
Seaside
Tillamook
Scappoose
McMinnville
Lincoln City
Newport
Waldport
Corvallis
Ocean
Pacific
Columbia
Willamette
Mount Hood
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No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data was compiled from multiple source data and may not meet U.S. National Mapping Accuracy Standard of the Office of Management and Budget.

Figure 2. Plentywater Project Alternative 2

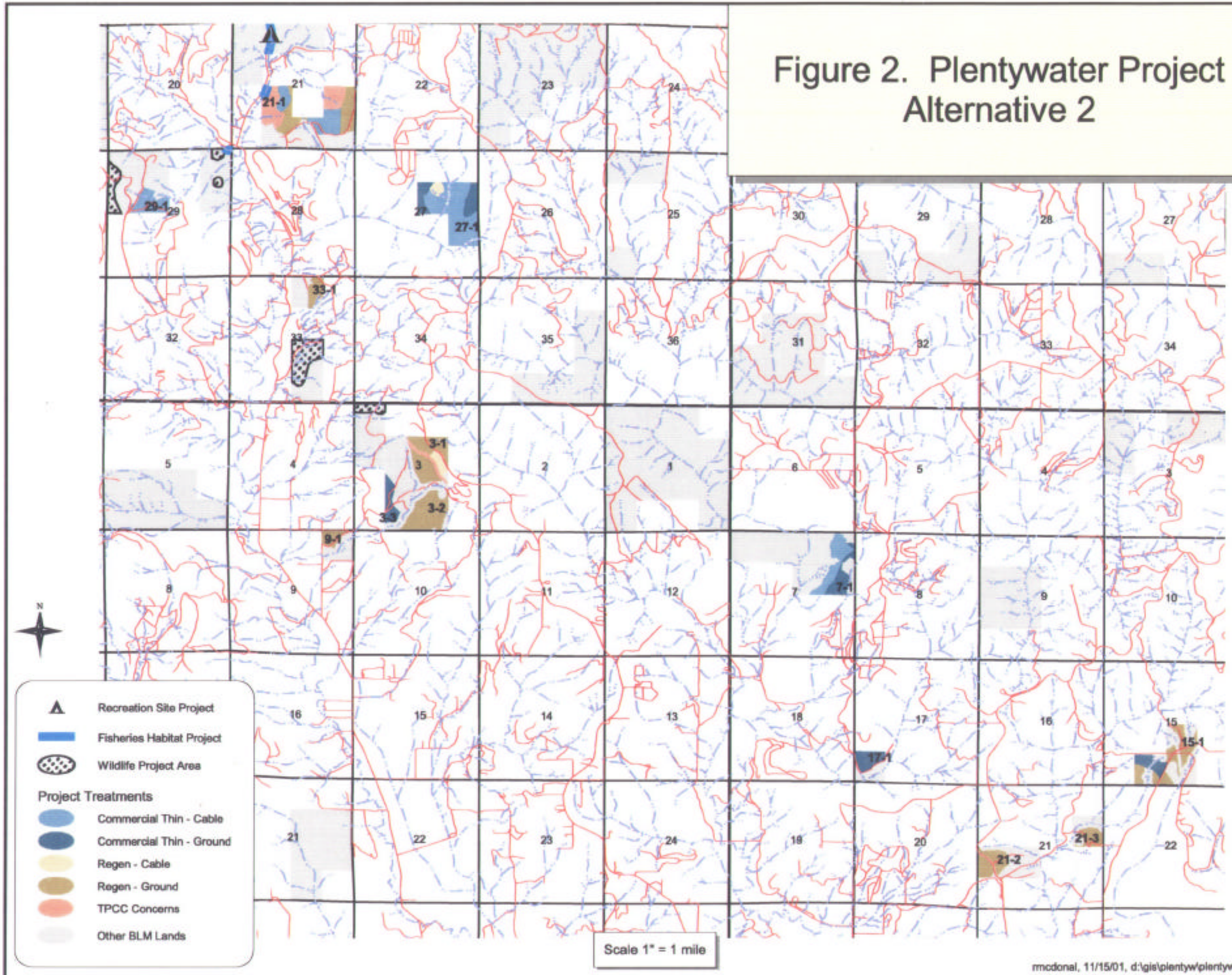


Table 1. Harvest Unit Information. This table summarizes the harvest unit information for the Proposed Action. Stand information and harvest volumes are estimates based on preliminary unit examination.

HARVEST UNIT(s)	ACRES (Approx.)	LOGGING METHOD	ESTIMATED HARVEST VOLUME (board feet)	Treatment Prescription Type
3-1, 3-2, 9-1, 21-1, 27-1, 21-2, 21-3, 15-1, 33-1	225	Ground Based	3,795	Regeneration
3-3, 21-1, 27-1, 17-1, 15-1	110	Ground Based	1,270	Commercial Thinning
3-1, 27-1	16	Cable	225	Regeneration
21-1, 27-1, 29-1, 7-1,	193	Cable	2,670	Commercial Thinning
Totals	544		8 MMBF*	

*Rounded to nearest million

Road Management:

The proposed action would involve approximately 9,700 feet of ***road construction*** of which approximately 5,000 feet would be rocked and considered to be ***permanent***; the remainder would be considered ***semi-permanent***. The project also involves the ***reconstruction*** of an additional 3,500 feet of existing natural surface road; and decommissioning of approximately 15,400 feet of semi-permanent and existing permanent roads (see Table 2) and the removal of one culvert. In addition the project would result in the designation/construction of approximately 108,900 feet of skid trails. Approximately 70,940 feet of skid trail along with all landings would be sub-soiled in the regeneration harvest areas.

Table 2. Road Summary - Proposed Action. Approximate amount (linear feet) of new road construction, reconstruction of existing roads and road decommissioning which would result from implementing Alternative 2 - Proposed Action.

Proposed Action	Reconst.	Maint.	*New Temp (**semi-perm)	*New Perm.	Mitigation Measures	*Decom-mission	*Net
T2N R2W, Section 21	0	800	300	0	Subsoil, waterbar, block and plant road.	1100	-800
T2N R2W sec. 17	500	2000	0	0	Subsoil, waterbar and block road	500	-500
T2N R2W sec. 15	0	0	1400	0	Subsoil, waterbar, block and plant road	2800	-1400
T2N R2W sec. 7	0	2000	0	3000		0	+3000
T3N R3W sec. 29	0	6000	0	0	Subsoil, waterbar, block and plant road	500	-500
T3N R3W sec. 21	0	7000	2000	0	Subsoil, waterbar, block and plant road	2000	0
T3N R3W sec. 27	0	2000	0	2000		0	+2000
T3N R3W sec. 33	0	7500	0	0		0	0
T2N R3W sec. 3 & 9	3000	6500	1000	0	Subsoil, waterbar, block and plant road	8500	-7500
TOTAL	**3,500**	**33,800**	**4,700**	**5,000**		**15,400**	**-5,700**

* New Temp. + New Perm. - Decommission = Net.

** Semi-permanent roads that may be used for longer than one dry season but are decommissioned by the end on the contract.

2.3.2.2 Watershed Restoration Projects on Matrix and RR Lands

It is expected that these projects would be implemented within 5 years from the effective date of the decision.

Wildlife Habitat Enhancement:

Five treatment units totaling approximately 80 acres (Three treatment units within T.3N., R.3W., Sec. 29 which are approximately 19, 5 and 3 acres in size; One treatment unit within T.3N., R.3W., Sec. 33 which is approximately 40 acres in size; and one treatment unit within T.2N., R.3W., Sec. 3 which is approximately 12 acre is size).

The design criteria used for analysis for the Wildlife Habitat Enhancement projects are as follows:

1. In the treatment area in the W **2** of the NW 1/4 of T3N., R 3W., section 29 which is approximately 19 acres in size, up to approximately two to three snags or snag top trees would be created per acre and up to two trees would be felled per acre. Snags, snag top trees and/or trees felled for CWD would be placed throughout the identified project area, individually and in small clumps. Only healthy Douglas fir would be treated. A number of factors would be considered in selecting trees for treatment in order to maximize the potential benefits to wildlife. If trees are selected for top girdling, they would generally have a live crown greater than 30% and be located adjacent to small openings; this reduced competition would increase the likelihood of the trees**:** continued survival. Trees dropped for CWD or killed for the creation of a snag would be selected to release individual or groups trees, either in the canopy or in the understory. The project would be implemented after August 5th but prior to March 1st. All work involving the generation of noise above the ambient level or climbing into the canopy above 25 feet which is conducted between August 6th and September 15 would not begin until 2 hours after sunrise and would halt two hours before sunset.
2. In the two treatment areas in the E **2** of the NE 1/4 of T3N., R 3W., section 29 which are approximately 3 and 5 acres in size, one clump of 2 - 5 snags per acre would be created. Only healthy Douglas fir would be treated by basal girdling. Snag clumps would be created to release existing understory regeneration and/or selected overstory trees where it is possible.
3. In the treatment area in the N **2** of the W 1/2 of the SE 1/4 of T3N., R 3W., section 33 which is approximately 40 acres in size, small clumps of overstory alders (up to approximately 8 to 12 trees) would be felled or girdled to release existing understory conifer regeneration and/or overstory conifers. Some underplanting of shade tolerant conifers within openings may occur depending upon site specific conditions. Up to approximately 5 clumps of alders per acre would be treated which would not be expected to reduce the existing total overstory by more than approximately 10%. Distribution of these groups of treated hardwoods would be dependent upon the distribution of existing conifers. Alders which would be expected to be appreciably contributing to stream shading would not be treated.
4. In the treatment area in the N **2** of the NW 1/4 of the NW 1/4 of T2N., R 3W., section 3 which is approximately 12 acres in size, small clumps of overstory alders (up to approximately 8 to 12 trees) would be felled or girdled to release existing understory conifer regeneration and/or overstory conifers. Up to an average of approximately 3 clumps of alders per acre would be treated which would not be expected to reduce the existing total overstory by more than approximately 5%. Distribution of these groups of treated hardwoods would be dependent upon the distribution of confers. Alders which would be expected to appreciably contribute to stream shading would not be treated.
5. No trees with an obvious nest or trees adjacent to any tree with an obvious nest would be selected for treatment. No trees with characteristics desirable to wildlife such as hollow cavities would be treated. No trees would be treated within approximately 100 feet of a permanent road open for public use.

6. A Botanist and/or a Wildlife Biologist would be involved in selecting all trees to be felled in order to minimize the potential for adverse impacts.
7. Trees to be felled would be selected and felled in such a way as to avoid impacting existing decay class 3, 4 and 5 down woody debris which is grater than 15 inches in diameter.
8. Occasionally, alder may be felled into the stream if they can be selected as to not impact stream shading. Any felling of trees into the stream channel would occur between July 1 and September 30 to be consistent with AOregon guidelines for Timing of InBWater Work to Protect Fish and Wildlife Resources@ (June 2000), unless a waiver is obtained from ODFW (Oregon Department of Fish and Wildlife).

Fish Habitat Enhancement project:

Fisheries habitat enhancement projects would be conducted in up to a total of 2,000 feet of stream located in one segment within T.3N., R.3W., Section 21.

Fisheries habitat improvement projects would be conducted in a manner which is consistent with the BMPs listed in the RMP (Appendix C-9). The appropriate BMPs along with additional project specific design features are:

1. Approximately 40 pieces (40 pieces X 40 ft. piece length = 1,600 lineal feet) of LWD would be placed in approximately 2000 feet of stream reaches within the Upper Diary Creek drainage.
2. Conduct in-stream work between July 1 and September 30, the time period with the least impact to fish. These dates meet ODFW AOregon Guidelines for Timing on In-Water Work to Protect Fish and Wildlife Resources@ (June 2000).
3. Wood for in-stream placement would generally not be acquired from the riparian areas adjacent to stream projects. An area approximately 1.5 acres in size in Section 3, T.2N. R3W., WM has been selected for the log source area.
4. All exposed soils would be stabilized and seeded or planted with native species upon completion of activities.
5. Disturbed sites that could potentially lead to sediment input would be rehabilitated to help minimize adverse effects to water quality.
6. Plant shade tolerant conifers in areas where light levels are sufficient to support rapid growth.
7. All equipment intended for instream work would be cleaned of grease, oil and dirt before movement into project area and check regularly for leaks while in operation.
8. Oil collection booms would be placed downstream of project areas and an approved spill clean up kit would be kept on site.
9. All machinery would be fueled outside of the riparian zone on hardened surfaces (roads and pullouts).

Campground Restoration:

1. Soil would be decompacted during optimal moisture conditions, as determined by the Authorized Officer and Field Office soil scientist. Decompacting would be accomplished by breaking up the soil with a toothed bucket equipped excavator.
2. Following decompacting, the area would be blocked to prevent vehicle access and planted with a variety of native tree and shrub species.

Road Stabilization:

BLM road number 3N-3-33 was damaged in the 1996 floods and requires stabilization work. A site stabilization plan would be developed prior to implementation which would likely include planting native trees and shrubs and constructing check dams.

2.3.3 Alternative 3 (Soil and Water Alternative)

Alternative 3 was developed to specifically address the Soil and Water issue caused by the forest management actions proposed in Alternative 2. Specifically, it is expected that the proposed action, primarily the use of ground-based equipment, the construction of roads and thinning forest stands located on steep slopes, would result in soil disturbance/compaction and increase the risk of land instability which may increase sedimentation, decrease soil productivity, and may have short- and long-term impacts on hydrology.

2.3.3.1 Forest Management on Matrix and RR Lands

Matrix and RR:

Alternative 3 would eliminate ground based harvesting in commercial thinning areas. Those areas which could not be cable thinned without the construction of additional road (additional to that proposed under alternative 2) were removed from the treatment area (see Table 3 and Figure 3). Alternative 3 would treat approximately 26 acres of RR. In addition, the allocation of roads between all season rock surface and temporary natural surfaced was modified. and additional seasonal restrictions would be adopted.

This alternative is expected to result in the production of an estimated 7 ***MMBF*** (million board feet) of commercial timber products (see Table 3).

Figure 3. Plentywater Project Alternative 3

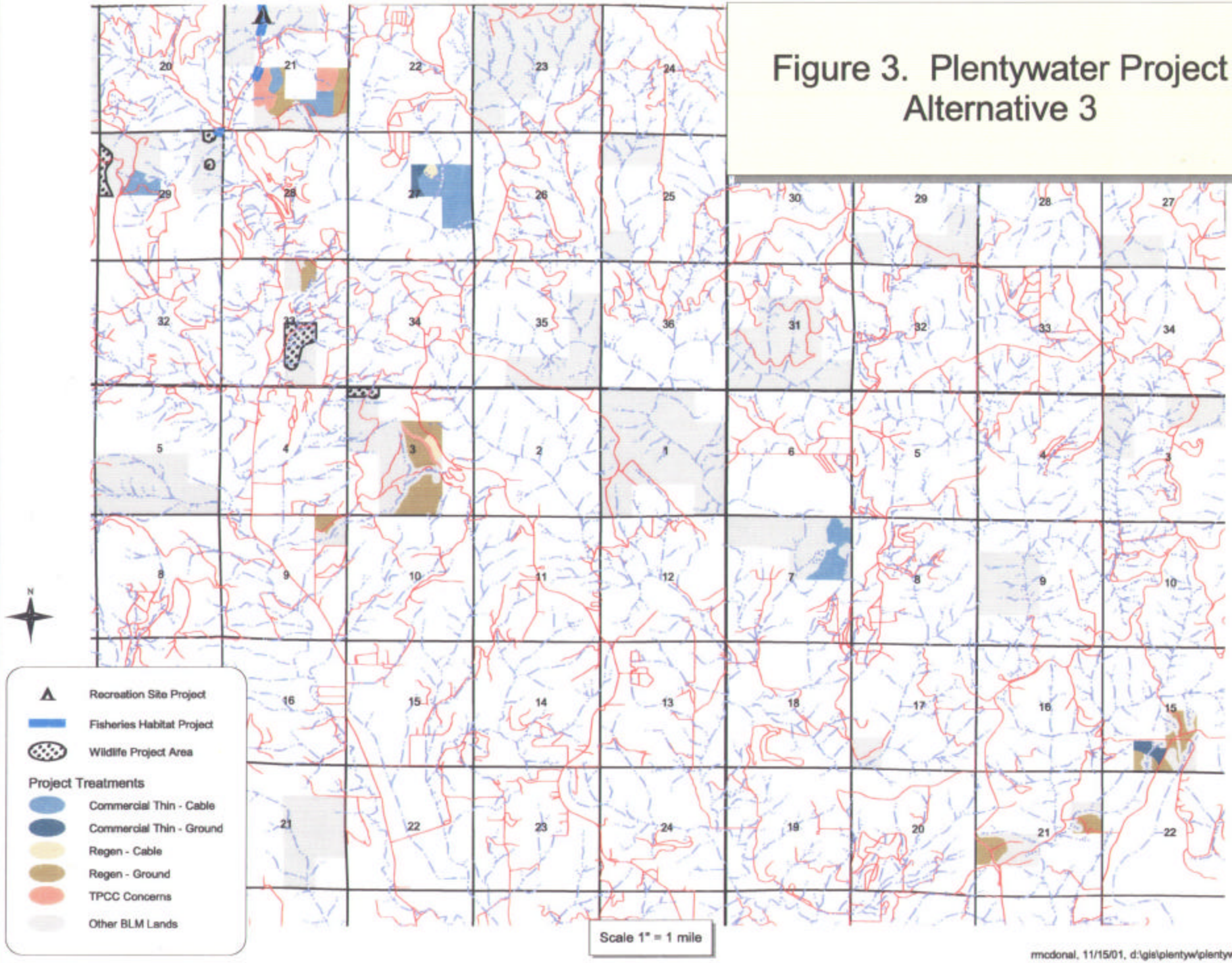


Table 3. Harvest Unit Information. This table summarizes the harvest unit information for Alternative 3. Stand information and harvest volumes are estimates based on preliminary unit examination.

HARVEST UNIT(s)	ACRES (Approx.)	LOGGING METHOD	ESTIMATED HARVEST VOLUME (board feet)	Treatment Prescription Type
3-1, 3-2, 9-1, 21-1, 27-1, 21-2, 21-3, 15-1, 33-1	225	Ground Based	3,795	Regeneration
27-1	5	Cable	70	Regeneration
21-1, 27-1, 29-1, 7-1, 15-1	228	Cable	3,020	Commercial Thinning
Totals	458		7 MMBF*	

*Rounded to nearest million board feet.

Road Management:

This alternative would involve approximately 9,700 feet of road construction all of which would be naturally surfaced and considered semi-permanent. The project also involves the reconstruction of an additional 3,500 feet of existing natural surface road; and decommissioning of approximately 19,900 feet of semi-permanent and existing permanent roads (see table 4) and the removal of one culvert. In addition the project would result in the designation/construction and sub-soiling of approximately 70,940 feet of skid trails.

Table 4. Road Summary - Soil and Water Alternative Approximate amount (linear feet) of new road construction, reconstruction of existing roads and road decommissioning which would result from implementing Alternative 3.

Alternative 3	Reconst.	Maint.	*New Temp (**semi-perm)	*New Perm.	Mitigation Measures	*Decom-mission	*Net
T2N R2W, sec. 21	0	800	300	0	Subsoil, water bar and block road; replant Conifer mix.	1100	-800
T2N R2W sec. 15	0	0	1400	0	Subsoil, water bar and block road	2800	-1400
T2N R2W sec. 7	0	2000	3000	0	Subsoil, water bar and block road	3000	0
T3N R3W sec. 29	0	6000	0	0	Subsoil, water bar and block road	500	-500
T3N R3W sec. 21	0	7000	2000	0	Subsoil, water bar and block road	2000	0
T3N R3W sec. 27	0	2000	2000	0	Subsoil, water bar and block road	2000	0
T3N R3W sec. 33	0	7500	0	0		0	0
T2N R3W sec. 3 & 9	3000	6500	1000	0	Subsoil, water bar and block road	8500	-7500
TOTAL	**3,500**	**31,800**	**9,700**	**0**		**19,900**	**-10,200**

* New Temp. + New Perm. - Decommission = Net.

** Semi-permanent roads that may be used for longer than one dry season but are decommissioned by the end on the contract.

2.3.3.2 Watershed Restoration Projects on Matrix and RR lands

These projects would remain the same as identified under the proposed action chapter 2.3.2.2.

2.3.4 Alternative 4 (Urban Interface Alternative)

2.3.4.1 Forest Management on Matrix and RR Lands

Alternative 4 would treat all of the units identified under either Alternatives 2 or 3 except those units falling within sections 17, 21, and 15 T.2N., R.2W., W.M., the Rural Interface Area (See Figures 4 and 5). Dust, road wear and garbage dumping for this area would occur at current levels. Harvest acres would be reduced by 124 acres. This alternative would treat from 22 to 26 acres of riparian reserve area. Selection of this alternative would reduce sale volume by approximately 2 mmbf and it would reduce net road mileage reduction by 1,900 feet.

Figure 4. Plentywater Project Alternative 4/2

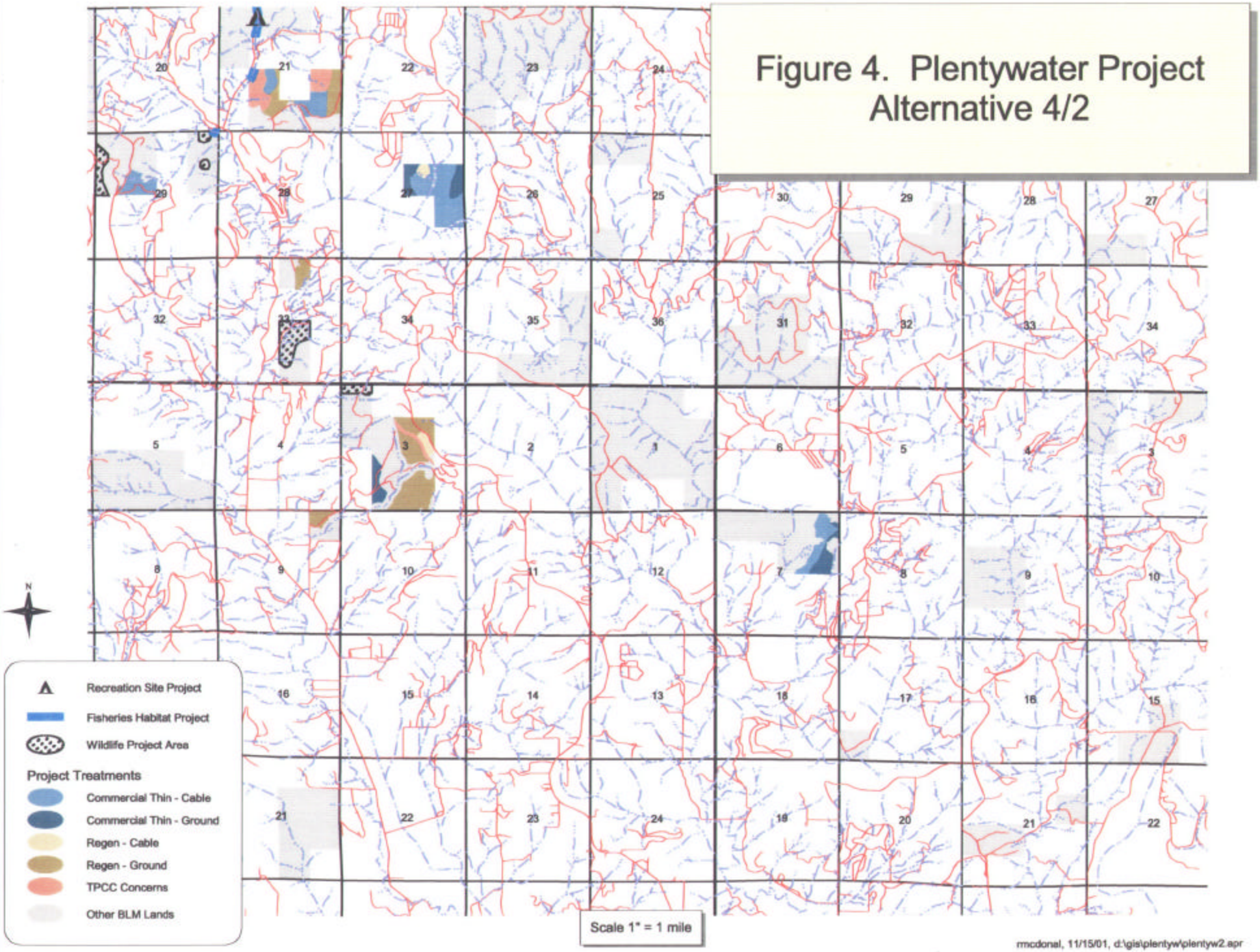
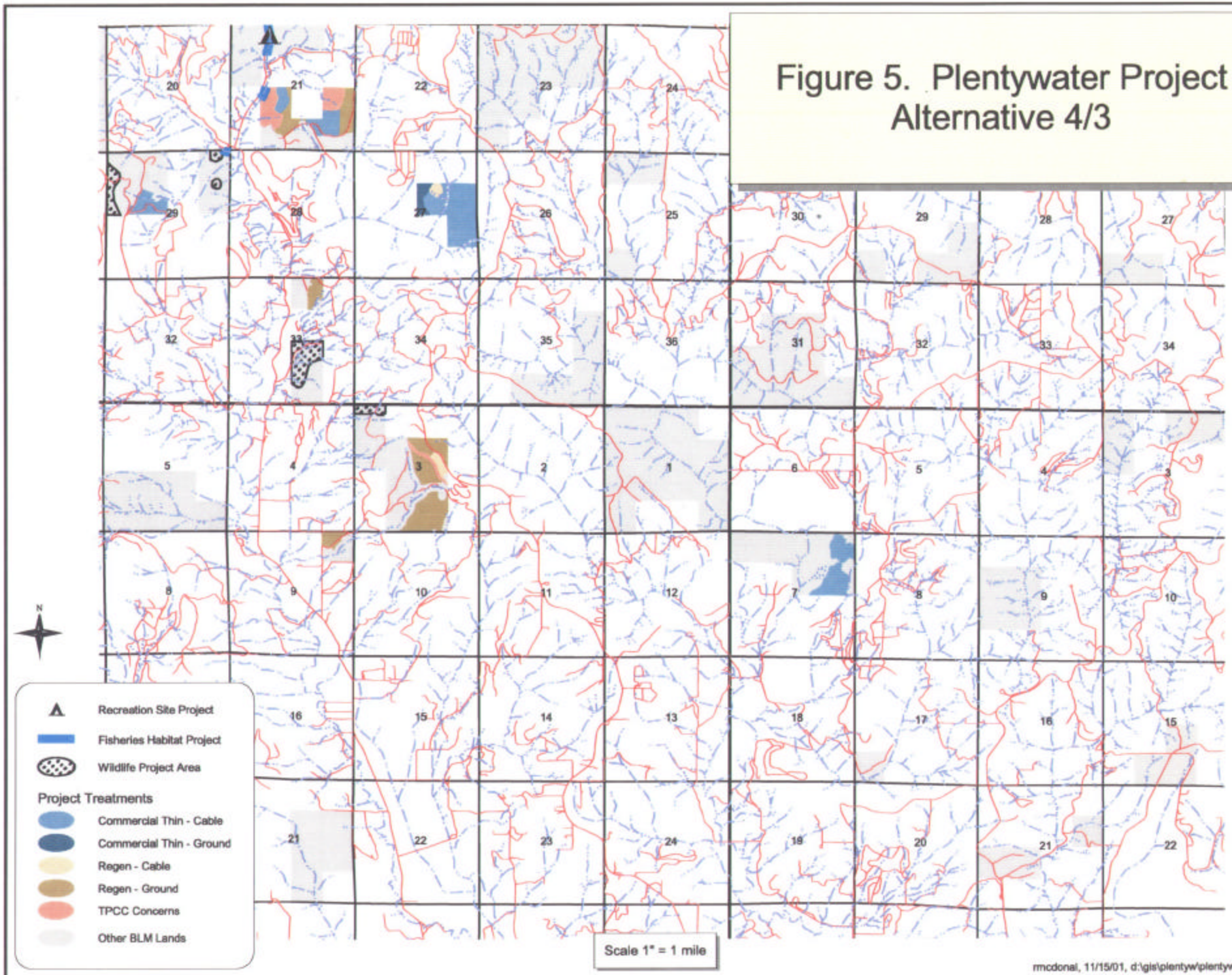


Figure 5. Plentywater Project Alternative 4/3



2.3.4.2 Watershed Restoration Projects on Matrix and RR lands

These projects would remain the same as identified under the proposed action chapter 2.3.2.2.

2.3.5 Alternative Comparison Table

Table 5. Comparison of Alternatives*. Comparison of the proposed treatment acres, Harvest Volume and road mileage associated with each alternative.

	Alternative 1 - No Action	Alternative 2 - Proposed Action	Alternative 3 - Soil and Water	Alternative 4 - Rural Interface	
				Alt. 2 w/o RI	Alt. 3 w/o RI
Treatment Units	N/A	3-1, 3-2, 3-3, 9-1, 21-1, 21-2, 21-3, 27-1, 15-1, 17-1, 29-1, 7-1	3-1, 3-2, 9-1, 21-1, 21-2, 21-3, 27-1, 29-1, 15-1, 7-1,	3-1, 3-2, 3-3, 9-1, 21-1, 27-1, 29-1, 7-1	3-1, 3-2, 9-1, 21-1, 27-1, 29-1, 7-1
Regeneration Acres	N/A	241	230	157	146
Commercial Thinning Acres	N/A	303	228	266	191
Acres Cable Harvest	N/A	209	233	209	233
Acres Ground-Based Harvest	N/A	335	225	214	104
Total Volume (mmbf)	N/A	8	7	6	5
Perm. Road (ft.)	N/A	5,000	0	5,000	0
Temp. Road (Semi-Perm.) (ft.)	N/A	4,700	9,700	3,000	8,000
Road Decommissioning (ft.)**	N/A	14,600	19,100	11,000	-16,000
Net Road Mileage	N/A	-4,900	-9,400	-3,000	-8,000

* Watershed Restoration projects remain the same throughout all of the action alternatives. Therefore, two watershed restoration alternatives exist; No Action and Action.

** Road decommissioning includes temporary (semi-permanent) road and existing permanent road which is no longer needed.

Chapter 3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter shows the present condition (i.e. affected environment) within the project area and the changes that can be expected from implementing the action alternatives or taking no action at this time. The Ano action@ alternative sets the environmental baseline for comparing effects of the action alternatives.

The Soil/Water and Rural Interface major issues, as described in Chapter 1.6, defines the scope of the environmental concern for this project. The environmental effects (changes from present baseline condition) that are described in this chapter reflect the identified major issues as well as three other elements of the environment (vegetation, wildlife, and fisheries). For those other resources or values for which review is required by statue, regulation, Executive Order, or policy, Appendix 3 "Environmental Elements" contains the appropriate documentation as to the effects of the proposed action on those resources or values.

Appendix 4 "Past, Present, and Reasonably Foreseeable Future Actions" contains a description of past, present, and reasonably foreseeable future actions that will be considered in the cumulative effects discussion in this chapter.

For a full discussion of the physical, biological and social resources of the Salem District, refer to the FEIS (Final Environmental Impact Statement), dated September, 1994, for the Salem District Resource Management Plan. The discussion in this EA is site-specific and supplements the discussion in the Salem District FEIS.

3.2 Vegetation

3.2.1 Special Status Species

3.2.1.1 Affected Environment

For information on the affected environment relative to Plant Species of concern see Appendix 5 - Biological Evaluation, Botanical Resources, Plentywater Creek Project.

3.2.1.2 Environmental Consequences

For information on the environmental consequences relative to Botanical Species of concern see Appendix 5 - Biological Evaluation, Botanical Resources, Plentywater Creek Project.

3.2.3 Forest/Riparian

3.2.3.1 Affected Environment

The timber stands proposed for treatment (including the watershed restoration project areas) consist of two general types: 1) young densely stocked conifer-dominated stands, and 2) mixed hardwood /conifer stands.

The young densely stocked conifer stands are dominated by Douglas-fir with minor components of western redcedar, western hemlock, and grand fir. The age of the conifers generally range from about 40 to 60 years. Canopy cover ranges from 80 to 95%. The understories usually consist of a scattered intermediate layer of hardwoods, principally red alder and bigleaf maple, and a lower denser layer comprised of a variety of brush and herbaceous species including: vine maple, hazel, huckleberry, ocean-spray, sword fern, dwarf Oregon grape, bracken fern, and salal. The conifer overstories have stocking levels which are currently resulting in various levels of inter-tree competition. This competition is manifested in receding live crowns, slowing radial growth rates, and tree mortality. The riparian areas proposed for treatment have essentially the same vegetative conditions as the upland areas, except that there are overall moderately higher stocking levels and canopy closure within the riparian areas.

The mixed hardwood/conifer stands have a wide range of variability, but generally can be characterized by overstory canopies that are composed of larger sized bigleaf maple and red alder, along with Douglas-fir, western redcedar, and other minor conifer species. Most of the overstory trees range in age from about 50 to 65 years, with a few scattered older remnant Douglas-fir and cedar which are 80 to 110 years old. Understories consist of a layer of brush and herbaceous species including: vine maple, hazel, huckleberry, ocean-spray, sword fern, dwarf Oregon grape, bracken fern, and salal. Conifer stocking levels are below optimal, and timber yields are much lower than what these stands are capable of producing. These stands have developed following widespread infection of laminated root rot, which killed large numbers of conifers and allowed the hardwoods to dominate in the infection areas.

See the Silvicultural Prescriptions: Plentywater Analysis Area, Appendix 1 for unit specific descriptions of forest stand conditions.

An analysis was completed of the late-successional forest (LSF) stands on federal lands within the Dairy Creek and Rock Creek watersheds (see *15% Analysis Documentation in Conjunction with the 3rd Year Evaluation of the Salem District RMP* updated 11/15/99 - a copy is located at the Tillamook RA office). In that analysis, LSF was defined as those stands in which the dominant component is 80 years old or greater. The analysis showed that in the Dairy Creek watershed, 6,135 acres of the federal land are forested, and 301 of those acres (5%) meet the definition of LSF. This is below the 15% level identified in the 15% Standard and Guideline (S & G) contained in the NFP pp. C44 – C45 and the RMP pp. 21-22.

In Rock Creek, the analysis shows that there are 230 acres of Federal forested land, and that 17 acres (7%) meet the definition of LSF.

Of those stands identified as LSF in the previously mentioned 15% analysis, none are proposed for treatment.

3.2.3.2 Environmental Consequences

3.2.2.2.1 Alternative 1 (No Action)

3.2.2.2.1.1 Forest Management on Matrix and RR lands

There are approximately 250 acres of stands proposed for regeneration harvest. With no treatment, these stands would continue to produce timber yields far below their potential for the next several decades. The existing conifers, which are generally in a dominant or co-dominant position, would be free to continue to grow and develop relatively large crowns and root systems. The exception to this situation would be in areas infected with laminated root rot, where the existing conifers would likely decline and die over the next couple of decades. In much of these stands where large relatively old hardwoods currently exist, these trees would start dying over the next several decades and create holes in the canopy large enough to allow the development of another layer of trees, which could be composed of either conifers or hardwoods. In either case, the resulting stand would consist of large scattered Douglas-firs over a shorter layer of Douglas-fir, hardwoods or a mixture.

There are approximately 325 acres of young, densely stocked stands that are proposed for thinning. This total includes about 37 acres of RR. In general, with no treatment at this time, individual tree growth within these stands would decline as competition for the sites= resources (most notably soil moisture, nutrients, light, crown space, and root space) becomes increasingly intense. Trees which are currently in subordinate canopy positions would be most affected in future years. The live crowns of these trees in particular would continue to recede as the stands become more crowded. Mortality of the shorter trees with the smallest live crowns would increase over the next several decades. Competition induced mortality would be manifested in a variety of ways including: the simple inability of trees with limited crown size and root structure to obtain enough of the critical resources on site to survive, stem buckling caused by a low diameter: height ratio, wind throw as a result of limited root systems, and Douglas-fir bark beetle infestations. Snags and coarse woody debris would increase over the next few decades, but the supply would be coming from the smallest diameter trees and would, therefore, be of limited value and duration. Without a thinning treatment, the average tree diameter over the course of the next several decades would be dramatically smaller in these stands when compared to what would be attained with the proposed thinning. From an economic viewpoint, without the proposed thinning treatment, opportunities would be foregone to utilize wood fiber from trees

which are generally projected to die in the relatively near future and to provide jobs for the local economy.

3.2.2.2.1.2 Watershed Restoration Projects on Matrix and RR lands

With no action on these projects, the forest stands proposed for treatment would continue to develop as described in section 3.2.2.2.1.1.

3.2.2.2.2 Alternative 2 (Proposed Action)

3.2.2.2.2.1 Forest Management on Matrix and RR lands

Approximately 250 acres would have a regeneration harvest. Following treatment within these stands, there would be a range of about 6 to 15 of the largest conifers per acre remaining. In some cases where there are not that many conifers currently existing, larger hardwoods would be substituted as conifer leave trees. These leave trees are intended to serve a variety of functions including: provide another canopy layer in the regenerated stand, wildlife habitat, a source for future snags, and a source for future coarse woody debris. As needed, some of these trees would be made into snags. Others would blow over. Many of these trees would continue to grow and survive for many decades. These areas would be planted with a mixture of conifer species to create the regenerated stands. Areas infected with laminated root rot would be planted with non-susceptible species. Competing vegetation would be controlled to allow these planted trees to grow quickly and develop into thrifty young timber stands. Within two to three decades, annual cubic foot conifer timber yields would far exceed current levels in these stands.

Approximately 325 acres would be commercially thinned. Included in this total would be about 37 acres of RR. Within these stands, trees in the subordinate crown classes and trees with the smallest live crowns would be harvested. Following this treatment, there would be very little inter-tree competition for the available site resources over the next two decades. The remaining trees would be free to grow with adequate space available for rapid crown and root expansion, and utilization of the available soil moisture, nutrients, and light would be optimized. The result would be a considerable increase in the growth rates of the trees, with the production of larger trees in a shorter time frame with longer, wider crowns, and more wind firmness. In the later part of the second decade following the proposed treatment, inter-tree competition should again begin to develop and the need for another treatment should then be analyzed. From an economic point of view, with the proposed thinning implemented, mainly trees anticipated to die over the next several decades would be sold, the wood fiber utilized, and jobs created for the local economy.

3.2.2.2.2.2 Watershed Restoration Projects on Matrix and RR lands

The fish habitat enhancement project would involve the regeneration harvest of approximately

1.5 acres to supply the logs for in-stream structures. This area to be harvested is adjacent to another proposed regeneration unit. The effects, therefore, would be similar as those described for the other regeneration areas. The flood plain restoration and road stabilization projects would have very little impact on forest stands. The creation of snags and coarse woody debris in the wildlife habitat enhancement project would provide attractive trees and down logs for Douglas-fir bark beetles to infest. These infestations may result in the mortality of additional Douglas-fir. This project would also result in the release of a few isolated trees in direct proximity to the trees that are felled or killed.

3.2.2.2.3 Alternative 3 (Soil and Water)

3.2.2.2.3.1 Forest Management on Matrix and RR lands

The effects of Alternative 3 on forest stands would be identical to Alternative 2, except that approximately 241 acres would have a regeneration harvest and approximately 241 acres thinned. Additionally, there would be approximately 9 acres proposed for regeneration and approximately 84 acres proposed for thinning that would not be accomplished and would have the same effects as described for Alternative 1.

3.2.2.2.3.2 Watershed Restoration Projects on Matrix and RR lands

The effects of these projects would be the same as described under section 3.2.2.2.2.2.

3.2.2.2.4 Alternative 4 (Urban Interface)

3.2.2.2.4.1 Forest Management on Matrix and RR lands

The effects of Alternative 4 on forest stands would be identical to Alternatives 2 and 3, except that there would be a range from approximately 155 to 164 acres receiving a regeneration harvest and 241 to 307 acres thinned. Additionally, there would be a range of 86 to 95 acres proposed for regeneration and 18 to 84 acres proposed for thinning that would not be accomplished and would have the same effects as described for Alternative 1.

3.2.2.2.4.2 Watershed Restoration Projects on Matrix and RR lands

The effects of these projects would be the same as described under section 3.2.2.2.2.2.

3.3 Soil (Major Issue)

3.3.1 Affected Environment

The Washington County Soil Survey and Multnomah County Survey show that there are 7 soil series and an unnamed alluvial soil distributed across the Plentywater Project Area. They are derived mainly from marine sedimentary rocks and basalt rocks with a component of silty loess material and volcanic ash. Soil textures are generally silt loam over silt loam or silty clay loam. Four of the soil series have fragipans. A fragipan is a dense, natural subsurface horizon that is low in organic matter and is slow or very slowly permeable. During the winter, the upper portion of some of the fragipans and the soil horizon immediately above it becomes wet or saturated. Project soils are moderately high or highly productive (Site Index II & III). Overall, there is a low accumulation of dead woody material and surface litter on the ground. Table 6 summarizes the soils locations and characteristics based on information provided in the soil surveys.

Table 6. Soil Characteristics and Management Concerns

Soil series	Timber Sale Units	Rooting Depth and (Depth to Bedrock)	Drainage	Slope* (%)
Cascade	15-1	20" to 30" fragipan (>60" to bedrock)	somewhat poorly	3-20
Cornelius	3-1, 17-1	30" to 40" fragipan (>60" to bedrock)	moderately well	12-60
Goble	3-1, 7-1, 15-1, 21-1, 21-2, 21-3, 33-1	30" to 45" to fragipan (>60" to bedrock)	moderately well	7-60
Kinton	3-1, 17-1	30" to 40' to fragipan (>60" to bedrock)	moderately well	2-60
Laurelwood	9-1, 17-1	>48" to dense alluvium (>60" to bedrock)	well	2-30
Olyic	21-1, 29-1, 33-1	>40" (>40" to basalt)	well	5-60
Saum	3-1, 7-1, 21-2	25" to 38" (>40" to basalt)	well	2-60
alluvial soils and stream deposits	Fish Habitat Creation, Campground Restoration	various depths to sands, rock fragments, basalt bedrock	well to very poor	0-2

* Slope percentage based NRCS soil survey. These are also small unmapped inclusions with steeper slopes.

The majority of proposed timber harvest units are on generally stable, gentle to moderately sloping hill-slopes and ridges. Roughly 20 percent of the proposed silvicultural treatment area is on slopes greater than 40 percent, the majority being between 40 percent and 60 percent. There are a few, small areas which have slopes greater than 70 percent. Approximately 33 acres (areas adjacent to Units 9-1 and 21-1) that were initially considered for harvest were dropped from treatment due to concerns for excessive erosion and landsliding.

Forest management practices conducted in the area have resulted in a patchy network of roads and skid trails. The most disturbed ground in the analysis area occurs in Unit 29-1 where an estimated 15 percent of the area is covered by compacted skid trails and roads. It is estimated that about 5 to 10 percent of the lands proposed for harvesting that are capable of being ground-based harvested are compacted. Skid trails are commonly 10 to 14 feet wide and partially covered by brush and young trees along the edges. Forest stands are fully occupied by tree canopies.

In winter of 1996, a large storm washed out about 1,500 feet of the 3N-3-33 road, sending a large quantity of fine sediment across the Dairy Creek/Bacona Road down into East Fork Dairy Creek. The washout created a large gully, over 700 feet long and up to 20 feet deep. There is no water running in the gully even during the winter. Active erosion by rilling and ravelling on the exposed soil surfaces is currently enlarging the gully.

There are two major management concerns with these soils:

1) Potential for compaction: Project soils are sensitive to compaction due to their high portion of silt and low gravel contents. When moist, these soils are easily compacted by heavy equipment operations or dragging logs. Some of the project soils remain wet for long periods.

2) Potential for accelerated surface erosion and mass movement: Bare soil surfaces on slopes more than 30% have medium to high runoff and high erosion risk. These soils rut readily when moist, by operation of heavy equipment such as tractors and skidders. Minimizing soil compaction, gouging and removal of protective vegetation cover should be a high priority. Some small areas within the proposed treatments are located on slopes greater than 70 percent. Slopes greater than 70 percent are at high risk to landsliding.

3.3.2 Environmental Consequences

Issue (Major): The proposed action (e.g., primarily the use of ground-based equipment, the construction of roads and logging steep slopes) would result in *soil disturbance/compaction* and increased risk of land instability which increase sedimentation, *decrease soil productivity,* and may have short-term and long-term impacts on hydrology.

Organic matter removal and compaction are generally considered to be the most important determinants in which forest management activities can affect future forest soil productivity.

Generally less important to forest soil productivity is soil surface loss and growing space loss. Preliminary results from a coordinated national research effort seem to indicate that most short-term (less ten years) declines in soil productivity are most likely caused by soil compaction and most long-term (greater than ten years) declines in soil productivity are more likely linked to organic matter losses (Elliot et al. 1996).

Organic matter plays an essential role in sustaining soil productivity. It provides a reservoir of nutrients for plant and animal growth, structural habitat material, improves soil structure and increases the soil buffering capacity. Soils compact less readily when soil organic matter is high. The primary way in which forest management activities reduce soil organic matter level is by timber harvest and site preparation.

The proposed forest management activities are not expected to alter soil organic matter levels and soil organisms (including mycorrhizal fungi) and nitrogen to the degree that they would adversely impact soil productivity for the following reasons: Native soils have naturally high organic matter contents in their surface horizons. Within regeneration units, adequate levels of green trees and existing coarse woody debris on the ground would be retained and protected to the greatest extent possible from disturbance. There would no whole-tree harvesting. Following regeneration harvest, a mixture of conifers would be planted. Site preparation would be limited to slashing all non-conifer vegetation and burning hand-piled slash or swamper burn slash in designated areas and a small area of broadcast burning. The broadcast burn would be limited to less than 20 acres in Unit 21-1, Area B regeneration harvest unit. The soils present in the unit are categorized "least sensitive" to impacts from burning according to the 1982 BLM Oregon State Office guide. There would be no soil surface scarification or clean mechanical piling. Soil organic matter levels are expected to remain essentially unchanged after harvesting.

Soil surface loss: Any practice which manipulates the top soil, especially by removing it, may reduce the site productivity. Soil surface loss reduces soil productivity by decreasing the amount of water available to plants and by removing organic matter and plant nutrients. Soil loss is most likely to occur with road, skid trail and landing construction, dragging logs, site preparation such as windrows, erosion and mass wasting. Surface soil loss is expected to be minimal due to implementation of appropriate project design features, BMPs, and site conditions which will minimize soil surface loss. Losses in soil productivity from soil surface loss are poorly documented and are difficult to assess. Their affects are usually more noticeable for water quality impacts than soil productivity. (For a discussion on expected project impacts from accelerated erosion and mass movement refer to Environmental Consequences in Chapter 3.4.2).

Growing space loss: Roads reduce forest productivity by the land they occupy. Once a road is constructed, the land it occupies remains out of timber production for a long period unless treated. Roads generally occupy a very small (less than 2%) portion of the timber growing base. Ripping natural surfaced roads would be expected to mitigate about 50% of the negative effects from soil compaction. Rocked roads, however, even after ripping and removal from motorized vehicle use for 40 years, are likely to remain minimally productive.

Soil compaction: Soil compaction, the reduction of total porosity, has been widely studied for the past 30 years and is relatively easy to measure. Soil compaction reduces soil productivity mainly by restricting water and gas movement, reducing root penetration and creating unhealthy living conditions for beneficial soil organisms such as fungi, nitrogen-fixing organisms, and arthropods. In forest operations, soil compaction is typically caused by repeated passes with heavy equipment such as standard wheeled or tracked skidders, especially when soils are moist or wet. Compaction can easily accumulate in time and space.

Currently there is limited data available quantifying the long-term effects on soil productivity from forest management activities. Quantifying the effects of soil disturbance on long-term soil productivity is difficult because of its variability and complexity. It is determined by cumulative interaction of climate, soil properties, organic matter, living organisms, topography and management practices. Researchers have reported mixed results on the effect that soil compaction and displacement on skid trails has on tree growth. There have been no studies completed for an entire rotation. Long-term soil productivity studies are currently being conducted by the BLM, Forest Service, and major universities and governments worldwide.

3.3.2.1 Alternative 1 (No Action)

3.3.2.1.1 Forest Management on Matrix and RR lands

The no action alternative would avoid potential soil impacts including increases in compacted surfaces and loss in soil productivity that would occur if another alternative was implemented. Current soil processes and conditions would continue to occur based on the existing conditions. There would also be little or no soil productivity recovery on the 4,900 feet of existing roads that would be decommissioned under the proposed action.

Long-term and Cumulative Effects: In the long-term, soil productivity would continue to slowly recover until the next soil disturbance. At the watershed scale, because the amount of disturbance (or lack of it) would be small and there would be no meaningful difference in cumulative effects between this alternative and the other alternatives. Since compacted areas can persist for decades, compaction can accumulate over time.

3.3.2.1.2 Watershed Restoration Projects on Matrix and RR lands

Fish Habitat Enhancement: No action would have no direct or indirect affect on soil productivity. Current soil processes and conditions would continue.

Wildlife Habitat Enhancement: No action would have no direct or indirect affect on soil

productivity. Current soil processes and conditions would continue.

Campground Restoration: Current soil processes and conditions would continue. The soil covering approximately 2 acres at the former Little Bend Recreation Site would remain compacted for several decades and continue to have low permeability and lower site productivity.

Road stabilization: The large gully associated with the 3N-33-3 road created during the1996 floods would continue to erode, further reducing soil productivity and during large storm events could send additional fine sediment into East Fork Dairy Creek.

Cumulative Effects: The no action alternative would avoid potential soil impacts including; accumulated increases in compacted surfaces; loss in soil productivity in the project area and watershed that may occur if another alternative was implemented. However, the benefit of improving soil productivity at the former Little Bend Recreation Site and stabilizing the large gully associated with the 3N-33-3 road would not occur.

3.3.2.2 Alternative 2 (Proposed Action)

3.3.2.2.1 Forest Management on Matrix and RR lands

Under this alternative, forest management actions are expected to result in the following direct and indirect effects:

1. Project actions are estimated to result in a total of about 50 acres of soil disturbance and compaction or about 10% of the total treatment area. This amount includes about 39.5 acres from timber harvest, about 3.5 acres from construction of new permanent road, about 2.5 acres from constructing and decommissioning temporary road, about 5.5 acres from reconstruction of existing road and decommissioning of existing roads, and about 2.5 acres from decommissioning additional existing roads. This would include rebuilding an approximately 3,000 square foot (130 linear feet) portion of an old logging road that has slumped down, as well as an approximately 750 square foot area to be used for a truck turn around, both of which are located within the RR in Unit 17-1. Also included would be rebuilding approximately 700 feet of BLM road 3N-3-33 located within RR.
2. The amount of land removed from the productive land base by new permanent road construction would be about 5,000 feet of road or about 22 acres.
3. Decommissioning roads would result in a net decrease of about 4,900 feet of road mileage, resulting in a net increase in productivity of 50% on approximately 2.4 acres.
4. Approximately 68% of the 533 acres to be logged would be yarded by ground-base equipment. Cable yarding systems impact the soil less and help to maintain soil productivity better than ground-based yarding. This includes yarding about 18 acres of RR. The operation of machinery would not be allowed within the RR except where it

could be operated from existing roads or compacted skid trails. Yarding these areas will require that some logs be pulled by a winch cable over the ground surface to a skid trail or landing.

5. Based upon limited research data and professional judgement, it is estimated that the proposed action would result in a net loss of soil productivity of approximately 12 acres.

Project actions such as creating new skid trails and removing trees adjacent to existing public roads with gentle slopes could open the forest to more cross-country travel by OHVs. New vehicular activity would increase ground disturbance and compaction which could reduce soil productivity.

Currently there is limited data available quantifying the effects on soil productivity from forest management activities. Quantifying the effects of soil disturbance on soil productivity is difficult because of its variability and complexity. It is determined by cumulative interaction of climate, soil properties, organic matter, living organisms, topography and management practices.

Refer to Appendix 6 Table 1 for a summary of the assumptions used to predict soil disturbance, compaction and soil productivity losses.

Long-term soil productivity studies are currently being conducted by the BLM, Forest Service, and major universities and governments worldwide.

The length of time in which compacted soils in the project area will impede water and root penetration is uncertain. Little research has been done in the Oregon Coast Range, but recovery has been reported to take from 16 to as many as 50 years. The following factors were observed in the project area: 1) Presence of good biologic indicators (favorable growing conditions- high moisture, mild temperatures, long growing seasons and high organic matter levels), 2) Most of the compaction is expected to be moderate (assuming that project design features and BMPs to minimize ground disturbance are implemented - e.g., designating skid trails and operating ground-based equipment when soil moisture is low), and 3) Compacted areas within regeneration harvest areas will be subsoiled and quickly reforested by planting an appropriate mix of native conifer species and/or hardwoods for the site. Considering the above factors, it is therefore likely that these soils will recover to near pre-disturbance levels relatively quickly, probably within 25 years or less.

Cumulative effects: Because soil compaction can persists for several decades, repeated entries into the same forest stands can cause compaction to accumulate on-site which could potentially result in losses in soil productivity. Most of the area proposed for ground-based yarding was entered in the 1950s and 1960s and currently up to 15 percent of the area is covered by compacted skid trails and roads resulting from the past activities. To minimize cumulative soil impacts, the existing skid trails would be utilized where practical. Following harvest, all skid trails within regeneration harvest units are expected to be decompacted (subsoiled). Skid trails within thinning units (approximately 107 acres) would not be subsoiled to avoid damaging tree roots.

However, thinning unit skid trails would be decompacted after a final harvest operation.

Off-site cumulative effects can occur from the contribution of accumulated effects from coexisting land-use activities. An analyses of cumulative effects on soil resources was conducted to address the effects of the proposed action along with past, present and reasonably foreseeable future actions on soil productivity within the Dairy-McKay watershed. Looking at the existing and anticipated road construction and ground-based and cable-based timber harvest gives a reasonable picture of the amount of soil disturbance in the watershed, which can then be related to the historic, undisturbed condition to give an overall view of soil productivity impacts in the watershed.

An analysis of GIS data sets for the three 6th field watersheds (Upper East Fork of Dairy Creek, Lower East Fork of Dairy Creek, and Upper McKay Creek) was used to identify disturbed lands. Lands most likely to be disturbed are roaded areas and lands capable of being ground-based yarded. Lands capable of being ground-based yarded are defined as being zoned for forestry and having slope gradients of less than 40%. Based on this analysis, there are about 477 miles of road and 43,000 acres of land capable of being ground-based yarded in the watershed. It is assumed that 80% of this area in the 64,800 acre three 6th field watersheds has been or will be disturbed by ground-based yarding equipment and roads. Using these assumptions, there are about 34,400 acres of disturbed land or approximately 53% of the watershed. This is considered to be a conservative estimate, because the area disturbed by tractor logging could be much higher. The 53% assumption does not include soil disturbance from cable-based yarding. In addition, the quantity of roads in the GIS database may be low.

The magnitude of any effect is generally proportional to the amount of disturbance. Project actions in this alternative would result in soil disturbance from forest practices, road decommissioning, and watershed restoration of about 52 acres and loss in productivity on about 103 acres in the watershed. In addition to this proposal, roughly 10 acres of ground may be disturbed from the implementation of the proposed BLM Powerline Dairy timber sale in the upper headwaters of Upper East Fork of Dairy Creek. Combined this would impact less than 0.01% of the total area in the three sub-watersheds, a minimal effect on the overall soil productivity of the watershed.

3.3.2.2.2 Watershed Restoration Projects on Matrix and RR lands

Short-term Effects:

Fish Habitat Enhancement**:** Under this alternative, yarding logs for the placement of logs in streams and the removal of a berm placed by the Washington County with heavy equipment would compact a small area. Approximately 40 logs would come off approximately 12 acres within a regeneration harvest Unit 3-1 on Matrix land. Yarding these logs will result in a small amount of disturbance and compaction. Following the regeneration harvest, skid trails will be

decompacted by subsoiling and thereby restoring most of the soil productivity. The logs will be carried by heavy equipment (probably an excavator) from paved roads across a few, short temporary access trails and placed into the streams.

Bare soil exposed by equipment is not expected to persist for more than one to three years before full vegetative cover is re-established. Erosion control measures would be implemented before fall rains. Most of the streambanks are low and stable and the stream channel consists mostly of large gravel, cobble or bedrock. Compaction levels are expected to be low because the project would be implemented during the summer when the soil moisture content is low and the soils are strong. Upon completion of instream work, compacted areas would be subsoiled with an excavator and felled trees and shrubs would be scattered over the disturbed sites, restoring nearly all of the soil productivity. Access trails would be water barred and blocked where appropriate, minimizing erosion and discouraging future ground disturbance from motorized vehicles.

Wildlife Habitat Enhancement: Under this alternative, there would be no direct affect on soil productivity. Proposed actions (e.g., girdling, felling of trees) would not disturb the ground surface. Felling trees may have a small indirect benefit on long-term soil productivity by providing additional organic matter to the soil. Current soil processes and conditions would continue to occur based on current conditions.

Campground Restoration: Under this alternative, approximately 2 acres of severely compacted ground at the former Little Bend Recreation Site would be decompacted with a toothed bucket equipped excavator. Decompacting the soil would break up the soil, improve permeability and soil productivity, and reduce water runoff. Future soil disturbance would be prevented by blocking the site from vehicle access and planting the site with native plant species. The site is nearly level and little or no surface water runoff or erosion is expected.

Road Stabilization: The roughly 3/4 acre associated with BLM road number 3N-33-3 which was damaged in the 1996 floods would be planted with a variety of native plants in the damaged area to stabilize the site. A minimal amount of soil disturbance and no loss in soil productivity is expected from planting vegetation and installing small check dams. The planted vegetation should help cover and bind the bare soil surfaces, help stabilize the gully and allow the process of healing to begin. Check dams would slow water down and hold back sediment in the remote chance of a large "gully washer."

Long-Term and Cumulative Effects: In the long-term, the compacted soils that were subsoiled in the fish habitat and campground restoration projects would be largely recovered. Felling trees in the wildlife project would not directly affect long-term soil productivity with the possible small benefit of providing additional organic matter to the soil. Stabilizing the gully associated with BLM road number 3N-33-3 would reduce future long-term soil productivity losses and would allow natural recovery to begin.

3.3.2.3 Alternative 3 (Soil and Water)

This alternative would eliminate ground based harvesting in commercial thinning areas. Those areas which could not be cable thinned without the construction of additional road (additional to that proposed under Alternative 2) were dropped from the treatment area. In addition, the allocation of roads between all season rock surface and temporary natural surfaced was modified, and additional seasonal restrictions would be adopted.

3.3.2.3.1 Forest Management on Matrix and RR lands

1. Short-Term Effects

Under this alternative, forest management actions are expected to result in the following effects:

1. Project actions are estimated to result in about a total of 40 acres of soil disturbance and compaction or about 9% of the total treatment area. This would include about 29 acres of disturbance from timber harvest, about 6 acres of disturbance from construction and decommission of temporary roads, about 1.5 acres of disturbance from reconstruction and decommissioning of existing road, and about 3 acres of disturbance from decommissioning additional existing roads.
2. There would be no area permanently removed from the soil growing base by new road.
3. Decommissioning roads would result in a net decrease of about 8,400 feet of road mileage.
4. Approximately 53% of the 463.5 acres to be logged would be ground-based yarded. Cable yarding systems impact the soil less and help to maintain soil productivity better than ground-based yarding. This amount includes about 4.3 acres of RR. (Machinery would not be allowed within the Riparian Reserve except where it could be operated from an existing road or compacted skid trail. Yarding these areas will require that some logs be pulled by a winch cable over the ground surface to a skid trail or landing).
5. Overall, it is estimated that all of the proposed actions would reduce timber productivity by 100% on 8 acres (about 2% of the total treatment area).

Refer to Appendix 6 Table 2 and summary of assumptions used to predict soil disturbance, compaction and soil productivity losses.

Slow draining soils (primarily in Unit 15-1) would be sensitive to compaction from ground-base equipment. The likelihood of severe compaction is increased by harvesting trees on slower drained soils early in the season. If trees are cut early in the season, they will no longer remove soil moisture through transpiration extending the time they are moist. Downed wood would also function as a mulch, greatly reducing evaporation and thereby increasing the time the soil will remain moist. (Refer to Recommended Mitigation Measures after Summary of all Proposals.)

Project actions such as creating new skid trails and removing trees adjacent to existing public roads with gentle slopes could open the forest to more cross-country travel by OHVs. New vehicular activity would increase ground disturbance and compaction and could potentially result in other negative impacts such as illegal dumping and vandalism. (Refer to Recommended Mitigation Measures after Summary of all Proposals.)

2. Long-Term and Cumulative Effects for All Projects and Alternatives

The differences in the amount of soil compaction and disturbance under this alternative compared to Alternative 2 and Alternative 3 would be too small to be measurable in a watershed level cumulative effects analysis. The proposed actions in this alternative would have similar long-term and cumulative effects.

3.3.2.3.2 Watershed Restoration Projects on Matrix and RR lands

For all Watershed Restoration Projects:

Proposed actions in this alternative are the same as in Alternative 2. Hence, all the effects are the same as disclosed for Alternative 2.

3.3.2.4 Alternative 4 (Rural Interface)

This alternative is similar to both Alternative 2 and Alternative 3 except that it differs by not treating timber sale units (Units 15-1, 17-1, 21-2, and 21-3) within the Rural Interface Area. There will be a range of effects as a result of analyzing both Alternative 2 and Alternative 3. Alt. 4/2 will denote Alternative 2 less the Rural Interface Area and Alt. 4/3 will denote Alternative 3 less the Rural Interface Area.. Alternative 4/2 would treat slightly more area (32 acres) and utilize more ground-based yarding and less cable base yarding than in Alternative 4/3.

3.3.2.4.1 Forest Management on Matrix and RR Land

Short-Term Effects
Under this alternative, forest management actions are expected to result in the following effects:

1. Alt 4/2: Project actions are estimated to result in about a total of 36 acres of soil disturbance and compaction or about 9% of the total treatment area. This would include about 27.8 acres from timber harvest, about 3.5 acres from construction of new permanent road, about 1.5 acres from construction and decommission of temporary road, about 1.5 acre from reconstruction and decommission of existing road, and about 2 acres

from decommission of additional existing road. Also included would be rebuilding approximately 700 feet of BLM road 3N-3-33 located within RR.

2. Alt. 4/3: Project actions for are estimated to result in about a total of 29 acres of soil disturbance and compaction or about 8% of the total treatment area. This would include about 19.5 acres of disturbance from timber harvest, about 5 acres of disturbance from construction and decommissioning of temporary roads, about 1.5 acres of disturbance from reconstruction and decommissioning of existing road, and about 3 acres of disturbance from the decommissioning of additional existing roads. Also included would be rebuilding approximately 3,700 feet of BLM road 3N-3-33 located within RR.
3. Alt 4/2: The amount land removed from the productive land base by new permanent road construction would be about 6,500 feet of road or about 2.5 acres.
4. Alt 4/3: There would be no area permanently removed from the soil growing base by new road construction.
5. Alt 4/2: Decommissioning roads would result in a net decrease of about 3,000 feet of road mileage.
6. Alt 4/3: Decommissioning roads would result in a net decrease of about 8,000 feet of road mileage.
7. Alt 4/2: Approximately 58% of the 411 acres to be logged would be yarded by ground-base equipment. Ground-based yarding, e.g. skidders or tractors, impacts the soil far more and does not maintain soil productivity as well as cable yarding. This includes yarding about 18 acres of RR. Machinery would not be allowed within the RR except where it could be operated from an existing road or compacted skid trail. Yarding these areas would require that some logs be pulled by a winch cable over the ground surface to a skid trail or landing.
8. Alt 4/3: Approximately 41% of the 367 acres to be logged would be yarded using ground-base equipment. Ground-based yarding, e.g. skidders or tractors, impacts the soil far more and does not maintain soil productivity as well as cable yarding. This includes yarding about 4 acres of RR. Machinery would not be allowed within the RR except where it could be operated from an existing road or compacted skid trail. Yarding these areas would require that some logs be pulled by a winch cable over the ground surface to a skid trail or landing.
9. Alt 4/2: Overall, it is estimated that all of the proposed actions would reduce timber productivity by 100% on 9 acres (about 2% of the total treatment area).
10. Alt 4/3: Overall, it is estimated that all of the proposed actions would reduce timber productivity by 100% on 6.5 acres (about 1.5% of the total treatment area).

Refer to Appendix 6 Tables 3 & 4 and summary of assumptions used to predict soil disturbance, compaction and soil productivity losses.

2. Long-Term and Cumulative Effects for All Projects and Alternatives

The differences in the amount of soil compaction and disturbance under this alternative compared to Alternative 2 and Alternative 3 would be too small too be measurable in a watershed

level cumulative effects analysis. The proposed actions in this alternative would have similar long-term and cumulative effects.

3.3.2.3.2 Watershed Restoration Projects on Matrix and RR lands

For all Watershed Restoration Projects:

Proposed actions in this alternative are the same as in Alternative 2. Hence, all the effects are the same as disclosed for Alternative 2.

3.4 Water

3.4.1 Affected Environment

1. Physical Setting

The project area is in the foothills of the northeastern Oregon Coast Range. Elevations range from 700 to 1,600 feet mean sea level. Two geologic units underlie the area, the Columbia River Basalt Group and related flows underlying the East Fork Dairy valley and adjacent hills and Marine Sedimentary (mainly sandstone) and Tufaceous Rocks which underlie everything else. The terrain has some steep mountain and hill slopes, but is dominated by rolling hills.

Mass movement is not as common in this area as in other watersheds in the Oregon Coast Range due to the smaller portion of very steep slopes and lower precipitation. Approximately 90% of the watershed has slopes under 40%, based on GIS analysis and local knowledge. Rotation slumps and debris slides are the most common forms of mass movement in the watershed. Slumps, soil creep, and earthflows are associated with hummocky, uneven broken terrain, seeps and displaced stream channels and silty/clayey-rich soils. Debris slides are more common on very steep (>70%) highly dissected, concave slopes, especially in inner stream gorges.

The watershed is typical of the Oregon Coast Range in both climatic and hydrologic features. Temperatures are mild, winters wet and the summers cool and mostly dry. Precipitation averages about 35 to 60 inches, falling mostly between November and March. The principal driver of hydrologic processes in the watershed is rain. The area may occasionally receive snow, but the quantity and duration of the snow do not normally produce rain-on-snow events. Stream flows respond quickly to rainfall and are notably higher in winter than summer. Subsurface flow is the dominant storm runoff mechanism. Overland flow rarely occurs on undisturbed forest floors due to the inherent high soil infiltration and permeability.

The project area is drained by two primary stream systems, East Fork Dairy Creek on the western portion and McKay Creek on the eastern portion of the project. In addition, about 45 acres of

BLM land is drained by upper Rock Creek on the southeast portion of the project area. Both the East Fork Dairy Creek and McKay Creek drain into the mainstem Dairy Creek. Dairy Creek and Rock Creek flow into the Tualatin River about 15 miles south of the project area and eventually discharge into the Willamette River.

The main channels of East Fork Dairy and McKay Creeks are mainly Rosgen C stream types (stream gradients less than 1%, located in alluvial valleys, with floodplains and moderate sinuosity). The upper portion of East Fork Dairy Creek changes to Rosgen B and F stream types. The 1996 flood and subsequent emergency repairs taken to protect the nearby road and bridge resulted in major alterations in the stream channel including some down-cutting, greatly reducing the diversity of aquatic habitats. The upper McKay Creek (beginning about a quarter mile downstream of Unit 7-1) flows through a hard rock canyon, increases gradient to 3 to 4%, looses sinuosity, channel substrate becomes mainly bedrock, and becomes step/pool system. Upper Rock Creek is mainly a moderately steep, deeply entrenched, slightly meandering, step/pool system before it empties into Alderwood Lake Reservoir.

The primary tributaries draining BLM lands in the project area are Denny Creek, Plentywater Creek, and Rock Creek flowing into East Fork Dairy and East Fork Creek flowing into McKay Creek. Generally these drainages have moderate to high gradients, low sinuosities, low width/depth ratios, and lack floodplain development. Channel substrates of these tributaries and smaller headwater streams are dominantly bedrock, gravels, and cobbles in stream-cut canyons and mainly sand and silt on narrow colluvial valleys and most headwaters.

2. Beneficial Uses

The beneficial uses associated with streamflow within the project area are salmonid fish (trout) spawning and rearing, resident fish and aquatic life, anadromous fish passage, public domestic water supply, irrigation, hydro-power, and water contact recreation. There are no known municipal water users in the project area. The nearest known instream or stream diverted municipal water right is over 12 miles downstream from the project area. There is a medium sized reservoir (Alderwood Lake) located on Rock Creek about 2.4 miles downstream from the project area used for fish and recreation and two small unnamed reservoirs located about 100 to 300 feet from Unit 29-1, used mainly for irrigation. There are five (5) valid water rights with special use permits on BLM in the near vicinity of timber sale units. For additional detail refer to Appendix 7, Table 1: Beneficial Uses Associated with Streamflow within the Project Area. For a list of beneficial uses within the Tualatin River Sub-Basin refer to Appendix 4: Past, Present, and Reasonably Foreseeable Future Actions.

3. Water Quality

According to the 1999 BLM/WCS&WCD Dairy-McKay Watershed Analysis, “The greatest impacts on hydrology have been experienced in valley portions of the watershed.” Most of these impacts are associated with stream channelization, loss of wetlands, disconnection of stream

channel from floodplains and wetlands, and instream diversions. The most likely water quality problems in the upper watershed are water temperature, stream channels containing little or no complexity, and surface erosion and mass movement concentrated in areas with steep slopes, high road densities and stream crossings. Past actions, primarily timber harvest, road construction, and agriculture and residential development, have influenced the hydrologic processes of the watershed to the point that most of the stream channels are not in "proper functioning condition." Most stream channels throughout the 5th field watershed including the project area are severely lacking large woody debris elements and other important structural elements, contributing to simplified habitats. Riparian zones are dominated by hardwood species such as red alder and bigleaf maple and various brush species. Prospects for the near and short-term recruitment of large woody debris is low on most streams. Large conifers, important for future large woody debris recruitment, are generally lacking. For additional discussion of the environmental baseline conditions and trends, please refer to: The Dairy-McKay Watershed Analysis; EA Appendix 4 "Past, Present, and Reasonably Foreseeable Future Actions"; and EA Appendix 8 "Matrix of Pathways and Indicators."

During 1999-2000, the ODF&W (Oregon Department of Fish and Wildlife) conducted habitat, fish and water surveys on the upper Tualatin and several tributaries of the Tualatin River to help assess the biotic health of the watershed. Of the 31 reaches surveyed, the upper reach of Upper East Fork Dairy Creek (Greener Road to the former Little Bend Recreation Site) had the most diverse habitat type (riffle>rapid>pool>glide), the least amount of soil and one of the most rock substrate type, and one of the highest shading level (79%). The index of woody debris was low (<2.0) for all streams and reaches. Water temperature was measured at 13.4°C in the summer of 1999. The temperature limit to support salmonid spawning and rearing should not exceed 12.8°C, and anything above 20°C has detrimental effects on cold-water species (DEQ 2000).

The DEQ (Oregon Department of Environmental Quality), as required by Section 303(d) of the 1972 Federal Clean Water Act, is responsible for identifying waters in the state that cannot meet the water quality standards without applying additional pollution controls already required for industrial sources or sewage treatment plants. Parameters impaired by the water quality limited water bodies are directly tied to the beneficial uses. Stream segments and parameters, which exceed water quality standards for this region, are summarized in Table 7 below. For additional information view the DEQ web site at http://waterquality.deq.state.or.us.

Table 7. Regional Water Quality Limited Stream (Final 1998 303(d) List)

Stream Segment	Parameter Standard Exceeded	Season of Concern
Dairy Creek (Mouth to East/West Forks)	Bacteria (Water Contact Recreation - E. coli)	Year around
	Temperature (Rearing 64F)	Summer
East Fork Dairy Creek (Mouth to Whiskey Creek)	pH (6.5-8.5)	Summer
	Temperature (Rearing 64F)	Summer
McKay Creek (Mouth to East Fork McKay Creek)	Bacteria (Water Contact Recreation - E. coli)	Year around
	Temperature (Rearing 64F)	Summer
Rock Creek (Mouth to Headwaters)	Bacteria (Water Contact Recreation - E. coli)	Year around
	Biological Criteria for Fish Communities	----------
	Chlorophyll a	Summer
	Dissolved Oxygen	May 1 to Oct. 31
	Temperature (Rearing 64F)	Summer

DEQ is also responsible for developing water quality standards to protect the most sensitive beneficial uses. ***TMDLs (Total Maximum Daily Load*****s**) have been developed for waters within the Tualatin Sub-Basin that fall short of water quality standards. DEQ has developed TMDLs to address temperature, bacteria and low dissolved oxygen and has revised the existing ammonia and total phosphorus TMDLs (in the mainstem Tualatin River). On January 31, 2001, the DEQ Tualatin River Sub-basin TMDL report was sent to U.S. Environmental Protection Agency for their approval. TMDLs will not be developed for habitat and flow modification (identified under biologic criteria). The focus on new TMDLs will be mainly on Tualatin's tributaries.

3.4.2 Environmental Consequences

Issue (Major): The proposed action (e.g., primarily the use of ground-based equipment, the construction of roads and thinning steep slopes) would result in soil disturbance/compaction and increased risk of land instability which may increase sedimentation, decrease soil productivity, and may have short-term and long-term impacts on hydrology.

3.4.2.1 Alternative 1 (No Action)

3.4.2.1.1 Forest Management on Matrix and RR lands

Under this alternative, there would be no timber hauling, road construction or harvesting activity which could increase anthropogenic erosion and sedimentation. Nor would any roads be decommissioned thus missing the opportunity to increase infiltration and reduce water runoff, sedimentation and the road density in the watershed. Current trends of change would continue. Residual effects of past road development, timber harvest, and other land use activities would continue to affect existing water quality conditions, streamflows, and channel conditions.

Cumulative Effects: Within the Dairy-McKay Creek watershed, most of the water quality indicators are not properly functioning or are at risk. The no action alternative would avoid potential adverse effects that may occur if another alternative was implemented. However, for the other alternatives, the risk that proposed action would contribute cumulative effects to hydrologic processes or water quality in these watersheds is judged to be low. The beneficial effects of reducing mileage within the watershed and speeding up the development of a future supply of large woody debris by thinning the outer portion of RRs would not occur under this alternative.

3.4.2.1.2 Watershed Restoration Projects on Matrix and RR lands

Fish Habitat Enhancement**:** The fisheries habitat improvement project would not take place. Streambed scouring and transport of sediment and bed load materials would continue during periods of high flows along approximately 1 mile of the East Fork Dairy Creek and Denny Creek. The aquatic habitat would remain simplified and the stream channel would remain disconnected from its floodplain.

Wildlife Habitat Enhancement: The implementation of the wildlife habitat enhancement project is not expected to have any direct or indirect affect on the water quality or hydrology. Therefore not implementing this project would have no affect on water resources.

Campground Restoration: The proposed watershed restoration project that would decompact the

former Little Bend Recreation Site would not occur. Approximately 2 acres of ground at the recreation site adjacent to East Fork Dairy Creek would remain compacted. Current streamside shading levels and stream temperature at the site (while better than along most of East Fork Dairy Creek) would remain below desired condition.

Road Stabilization: The large gully created by the 3N-3-33 road washout would continue to erode and enlarge, potentially moving more fine sediment into East Fork Dairy Creek.

Cumulative Effects: No action would result in no cumulative effects at the watershed level of analysis. The lower soil productivity at the former Little Bend Recreation Site and the large gully associated with the 3N-33-3 road would continue but would be too small to be meaningful at the watershed level of analysis.

3.4.2.2 Alternative 2 (Proposed Action)

3.4.2.2.1 Forest Management on Matrix and RR Land

Short-Term Effects

Summary

Proposed action in this alternative is unlikely to substantially alter, impede and/or prevent attainment of the water quality, channel function, stream flow and basin hydrology objections of the Aquatic Conservation Strategy (Refer to Appendix 9). There maybe some small, short-term (within the next ten years) increases in sedimentation and stream turbidity, but any increase in mass wasting and changes in the sediment regime are unlikely. There may be some alteration in the capture, infiltration and routing of water, but any change would be difficult to measure and not likely to substantially change stream flow, sediment regime and channel morphology. Any changes are in flow would be expected to return to pre-existing conditions following canopy closure.

Water Quality

Most existing and planned roads for construction and decommissioning are on gentle slopes, stable positions, mostly on ridgetops located far away from drainage channels, thereby limiting the potential for routing sediment and interception or disruption of subsurface water. Construction and decommissioning would be restricted to periods of low rainfall and surface water runoff. Most sediment coming off the roads would be effectively filtered by the forest floor in untreated RRs before reaching streams.

The only disturbance anticipated within RRs resulting from road maintenance/construction

would be in Unit 3-2 and Unit 17-1 and Unit 33-1. Unit 3-2 would require some minor maintenance and removal of a small culvert. The culvert drains a small, low gradient, non-fish bearing, perennial stream. This may increase turbidity in the short-term, but would eliminate the eventual failure of this culvert which would result in additional sediment into the stream. In Unit 17-1, an approximately 150 foot section of an old logging road would be rebuilt within a RR. The road intersects BLM road 2N-2-18 and would allow access to the upper portion of the of the unit. Most of the road within the RR has slumped and is now difficult to recognize. Rebuilding this section would have the same impacts as building a new road. Unit 33-1 would require the reconstruction of approximately 700 feet of the 3N-3-33 road. A small, deeply incised, non-fish bearing perennial/intermittent stream and large gully parallels the road. The small stream drains into a narrow valley containing unconsolidated clay, silt and gravel deposits disappearing just above Dairy Creek/Bacona Road. Only during some particularly large storms has water from the small stream flowed over the road and across 200 feet of farmland into East Fork Dairy Creek. East Fork Dairy Creek is an anadromous fish bearing stream. Reconstruction of the 3N-3-33 road impacts to on-site water quality may occur due to sediment induced draw into the stream during or shortly after construction activities.

Road decommissioning following timber harvest would result in a net reduction in 4,900 feet of road mileage in the watershed. A small, short-term increase in erosion and sediment would be expected in the first winter following the decommissioning activities as a result of localized soil disturbance. Subsoiling roads will increase soil infiltration, disperse surface water, encourage vegetation recovery and reduce long-term erosion.

Log hauling on forest gravel roads, particularly when the water is flowing, would generate fine sediment which could potentially increase local stream turbidity and further degrade stream substrate conditions. Low traffic volume/day, rocking of roads, and monitoring conditions during heavy rains by the Authorized Officer should keep any increases in sediment and turbidity small and short-term.

With the possible exception of treating Unit 17-1, increases in sediment delivery and turbidity as a result of timber harvest activities are expected to be small and short-term for the following reasons: 1) Approximately 80% of the land to be harvested is on slopes less than 40%; 2) Steep slopes near streams would not be logged where there is high potential for mass wasting; 3) Skid trails and ground-based yarding equipment would generally be prohibited within RR (Machinery would not be allowed within the RR except where it could be operated from an existing road or compacted skid trail); 4) RR would have a 100-foot “no cut” buffer on both sides of fish bearing streams and a 50-foot “no cut” buffer on non-fish bearing streams and wetlands less than one acre. However, skyline corridors would be cut through the “no cut” buffers to allow harvest of the western and extreme southern portions of Unit 27-1. The trees cut to facilitate yarding would not be removed from the site and a full suspension cable yarding system would be required to cross streams; 5) Most of the sediment produced from timber harvesting would travel short distances before being trapped by duff, woody materials and other obstructions. Most of the overland flow in the treatment would not be channelized. Non-channelized flow on these forest

soils is usually less than 30 feet and it rarely travels more than 100 feet unless the ground is compacted or on steep slopes.

Yarding portions of Unit 17-1 will increase the risk of sediment delivery into East Fork McKay Creek. East Fork McKay Creek is a large, perennial stream with anadromous fish. Some short (50 to 150 feet long), steep sections with slopes up to 75% would yarded downhill and uphill with ground-based equipment by use of a winch line and "felling to lead" yarding technique. While most trees to be logged are small, dragging logs over steep ground to a skid trail or landing could result in gouging, making the area more prone to erosion and potentially creating conditions favorable for channelized flow. Vegetation buffers are usually not effective for filtering sediment if overland flow becomes channelized. In addition, moving ground-based equipment across a swale/ditch adjacent to the 2N-2-18 road along the western edge of Unit 17-1 would increase the risk for sediment transport into the ditch where it could be easily transported through a culvert, down an intermittent stream channel and eventually into East Fork McKay Creek.

To protect watershed conditions in the RRs, trees within Unit 17-1 would be yarded during periods of dry soil conditions, yarding within RRs would require a minimum of one end suspension, areas gouged on erosion prone steep slopes would be hand water barred, less unstable area in the northwest corner would not be logged, and waddles would be placed in swale above ditch adjacent to the 2N-2-18 Road. The spur road off of the 2N-2-18 Road would be used and decommissioned in one season. It would be designed to minimize sediment runoff and the lower portion of the road within the RR would be re-contoured to slope.

In Unit 27-1, felling a small number of trees in the stream channel as a result of constructing cable yarding corridors could result in small, short-term increase in sediment delivery, which should not be visible or measurable downstream from the project area. The required logging system would provide full log suspension over stream channels. All trees cut within the 50-foot "no-cut" buffer would be retained on site and dropped into the stream channels, where possible, to provide some additional stream structure.

Phosphorus was an earlier concern for the Dairy Creek McKay watershed. Researchers have since found that background levels were much higher than originally expected and that most of the sources of phosphorus appear to come from human sources such as agriculture and rural runoff and wastewater and sewer discharges in the lower watershed. Little phosphorus is expected to result from most forestry operations. Additional water quality parameters (e.g., bacteria, dissolved oxygen, pesticide and herbicide residues, etc. [U.S. EPA 1991]) are unlikely to be affected by the proposed action and were not reviewed for this analysis.

The proposed action would maintain water temperatures by preserving current shade levels along streams. Most stream channels within the project area do not flow during the summer. Approximately 37 acres would be commercially thinned within RR land use allocation. "no-cut" buffers would be placed on all stream channels (50-foot on non-fish bearing and 100-foot on fish bearing streams) would maintain the current canopy and shade cover over streams. The one

exception to this would be in Unit 27-1. Trees would be cut within the 50-foot "no-cut" buffer to allow for about 14 cable corridors (about 10 feet wide and spaced approximately 150 feet apart) to cross two small, perennial streams. The small corridors cut over the stream channels are not expected to be large enough to lower stream side shading levels sufficiently to raise water temperatures.

Proposed forest management activities are not likely to affect the 5 water rights with special use permits adjacent to timber sale units. A 50-foot "no-cut" buffer should be sufficient to protect a domestic and a power water right in Unit 29-1, which are apparently not in use, on gentle ground proposed for commercial thinning and cable yarding. The other water rights would have at least a minimum of 180 foot "no-cut" buffer.

Channel Function, Stream Flow and Basin Hydrology

Proposed actions in this alternative are unlikely to measurably effect, impede and/or prevent attainment of the channel function, stream flow and basin hydrology. Past land use activities (e.g., channelization, loss of wetlands, and floodplain disconnection) have altered stream channels functions to such an extent that streams are no longer in properly functioning condition. These channel changes are not likely to noticeably change for decades. For additional baseline information, please refer to Appendix 4 "Past, Present, and Reasonably Foreseeable Future Actions".

The portion of the watershed area that would be harvested under this alternative is small (less than 1%). None of the roads proposed for construction are likely to intercept ground water with the possible exception of less than 200 feet of midslope access road in Unit 17-1. This alternative proposes to reduce the total amount of roads in the watershed by nearly 1 mile. Any changes in the capture and routing of precipitation would likely return to pre-treatment conditions as the remaining forest fills out.

Long-Term and Cumulative Effects

A "Level 1" analysis of the risk for cumulative effects to hydrologic processes, channel conditions and water quality for the Upper East Fork Dairy Creek, Lower East Fork Dairy Creek, and Upper McKay Creek sub-watersheds were conducted utilizing the Salem District Watershed Cumulative Effects Analysis Procedure, FY1994. GIS data sets were utilized in the analysis. An analysis was not performed on the Upper Rock Creek sub-watershed because only about 22 acres in a 16,874 acre watershed would be affected by project actions. This would increase the land in young-stand, grass-forb and non-forest condition by less than 1 percent. As a consequence, no noticeable cumulative effect would be expected in the sub-watershed.

Table 8 summarizes observations made of the character of the watershed.

Table 8, Summary of Sub-Watershed Characteristics

	Sub-Watershed			Total
	Upper East Fork Dairy	Lower East Fork Dairy	Upper McKay	
Area	20,702 Ac	20,400 Ac	23,694 Ac	64,796 Ac
Road Density	4.74 mi/mi^2	4.95 mi/mi^2	4.48 mi/mi^2	4.71 mi/mi^2
Area within Rainfall-Dominated Zone	100%	100%	100%	100% (including Upper Rock Creek).
BLM Land Area / (% of watershed)	2,871 Ac (14%)	1,014 Ac (5%)	2,445 Ac (10%)	6,330 Ac (10%)
Lands Zoned for Forestry	19,889 Ac	7,347 Ac	17,355 Ac	44,591 Ac
Lands in Forestry with slopes less than 40% / (% of watershed)	19,051 Ac (92%)	7,313 Ac (>99%)	16,646 (96%)	43,010 Ac (96%)
BLM Land in Young-Stand & Non-Forest Condition	424 Ac	128 Ac	106 Ac	658 Ac
Land in Young-Stand, grass-forb & Non-Forest Condition (including agriculture)/ (% of watershed)	6,633 Ac (32%)	15,708 Ac (36%)	14,147 Ac (77%)	36,488 Ac (56%)
BLM Proposed Regeneration Harvest Area/ (% of watershed)	47 Ac	108 Ac	67 Ac	222 Ac (0.3%)

1. Risk of groundwater interception and routing of flows is low due to the very low percentage of roads having slopes greater than 40 percent. There would be some road maintenance, nearly one mile of new road and nearly one mile of temporary road construction, but following road decommissioning there will be a net reduction of almost one mile of road.
2. Past land management actions, primarily forest harvest, road construction and conversion of forest land to agriculture land are probably still affecting channel morphologies, streamflows, and hydrologic conditions.
3. Currently between 32% to 77% of lands in the sub-watersheds are in young-stand, early grass-forb and non-forest condition.
4. Regeneration harvest in this alternative would increase the total area in young-stand, early grass-forb and non-forest condition by approximately 246 acres, less than 1% in any sub-watershed.
5. Proposed action would decrease the net road mileage by 4,900 feet and increase the long-

term recruitment potential of large woody debris to streams. Since large woody debris is low in all of the streams in the vicinity of the proposed action, long-term large woody debris supply to streams is likely the most critical factor for maintenance of aquatic habitat.

Considering the above factors, and the fact that most of the water quality indicators are at present not properly functioning or at risk, and the known and anticipated actions within the Dairy-McKay Creek watershed (Refer to Appendix 4 "Past, Present and Reasonably Foreseeable Future Actions"), the risk for this proposal for contributing to cumulative effects to hydrologic processes or water quality in these watersheds is low. The anticipated actions are expected to maintain the condition of these indicator, except for the road density. Any alterations in peak flows, storm flow, and low flows are not likely to measurably increase as a result of logging and road building.

3.4.2.2.2 Watershed Restoration Projects on Matrix and RR lands

Fish Habitat Enhancement:

Short-Term Effects

Placement of approximately 40 logs along approximately 2,000 feet of the East Fork Dairy Creek and removal of a berm along East Fork Dairy Creek with heavy equipment would result in some short-term, variable increase in sediment delivery. It is assumed that all the logs used in the project would come from off-site or outside the riparian zone. Favorable site conditions (e.g., level ground, stable banks, rocky/cobbly channel) and careful design and implementation of the stream structures will help minimize the risk of stream bank erosion, sediment delivery, and adverse changes to the channel morphology. If impacts occurred, they would be both short and long-term in duration. With the use of design features and proper project implementation, the indirect risk of resource damage is expected to be low.

The proposed actions are unlikely to affect water temperatures. Only a small amount of vegetation would be removed, constituting none or a very small portion of the stream side influence zone and direct shade off the streams. Vegetation would be quickly replanted. The overall effects of the proposed project on water temperature are expected to be neutral in the short-term.

Long-Term and Cumulative Effects

In the long-term, the project would benefit the watershed by returning the stream reach toward a more natural sediment routing regime. Woody debris, bedload, and sediment material would accumulate behind these stream structures and be released in pulses during winter storm events. Placement of in-stream structures and removal of the berm would also increase the water levels

behind them during high flow events, which would help restore the streams connectivity with their floodplains. Creation of a larger floodplain would store more water and moderate flows in the winter and summer.

No cumulative effects are anticipated from this action because effects are limited in space.

Wildlife Habitat Enhancement:

Short-Term Effects

Under this alternative, a small number of hardwood trees would be girdled, topped, or felled. There would be no ground disturbance. Approximately half the treatment area, approximately 40 acres, would be within RR. No more than 10% of the existing total overstory would be removed. Trees which could contribute appreciable stream shading would not be treated. Therefore, the proposed actions are expected to maintain current water quality conditions.

Long-Term and Cumulative Effects

In the long-term, felling of some hardwoods would create more habitat complexity within the watershed and potentially increasing the size of adjacent conifers.

No cumulative effects are anticipated from this action because effects are limited in space and are short term in nature.

Campground Restoration:

Short-Term Effects

Under this alternative, decompacting 2 acres of ground at the recreation site would slightly increase the risk of sediment delivery into the upper East Fork Dairy Creek. The risk is expected to be small due to implementation of BMPs and the fact that the ground is nearly level and decompacting the soil should increase infiltration and therefore decrease the potential for water runoff. Planting native vegetation would reduce erosion.

Long-Term and Cumulative Effects

Decompacting 2 acres would continue to decrease surface runoff and sediment delivery. In time the planted native vegetation would provide additional streamside shading and input of large wood into the stream.

No cumulative effects on water quality or hydrology are anticipated from this action because effects are limited in space and are short-term in nature.
Road Stabilization:

Short-Term Effects

Minimal amount of ground disturbance would occur from installing check dams and planting a variety of native plants to stabilize the BLM road 3N-33-3 site. Planted vegetation would help cover and bind bare soil and reduce future erosion and potential sediment delivery. Installing small check dams would reduce the risk of sediment being delivered into Dairy Creek.

Long-Term and Cumulative Effects

Erosion and potential sediment delivery rates would continue to decrease as the vegetation continue to grow.

No cumulative effects are on water quality or hydrology are anticipated from this action because effects are limited in space and are short term in nature.

3.4.2.3 Alternative 3 (Soil and Water)

3.4.2.3.1 Forest Management on Matrix and RR Land

Short-Term Effects

Water Quality

This alternative would lower the risk of sediment delivery to streams. Compared to Alternative 2, this alternative would: 1) Reduce total soil disturbance by approximately 13 acres; 2) Increase the proportion of area would be cable yarded rather than ground-based yarded; 3) Eliminate new permanent road construction and increase the amount of road mileage decommissioned following the completion of timber harvest; 4) Eliminate the moderate risk for increased sediment delivery and turbidity from logging Unit 17-1; and 5) Reduce the potential for surface runoff and sedimentation delivery by requiring that more of the timber harvest activities take place when the soils are dry.

Channel Function, Stream Flow and Basin Hydrology

The effects from this alternative are similar to those disclosed for Alternative 2. Actions are unlikely to measurably effect the channel function, stream flow and basin hydrology.

Long-Term and Cumulative Effects

The differences in the amount of disturbances under this alternative compared to Alternative 2

would be too small too be measurable in a watershed level cumulative effects analysis. This alternative would have similar long-term and cumulative effects as Alternative 2.

3.4.2.3.2 Watershed Restoration Projects on Matrix and RR lands

For all Watershed Restoration Projects: The effects from this alternative would be same as those disclosed for Alternative 2.

3.4.2.4 Alternative 4 (Rural Interface)

This alternative is similar to both Alternative 2 and Alternative 3 except that it differs by not treating timber sale units (Units 15-1, 17-1, 21-2, and 21-3) within the Rural Interface Area. There will be a range of effects as a result of analyzing both Alternative 2 and Alternative 3. Alt. 4/2 will denote Alternative 2 less the Rural Interface Area and Alt. 4/3 will denote Alternative 3 less the Rural Interface Area..

3.4.2.4.1 Forest Management on Matrix and RR Land

Short-Term Effects

Water Quality

Alternative 4/2 would treat slightly more area (44 acres) and utilize more ground-based yarding and less cable base yarding than in Alternative 4/3. Alternative 4/2 would eliminate the moderate risk for increased sediment delivery and turbidity from logging Unit 17-1. Because this alternative would harvest less land (52 to 122 acres) than Alternative 2 and/or 3, the potential for adverse water quality impacts to aquatic resources from timber harvest activities under this alternative would be lower compared to Alternative 2 and/or 3.

2. Channel Function, Stream Flow and Basin Hydrology

The effects from proposed actions in this alternative are similar to those disclosed for Alternative 2. Proposed actions are unlikely to measurably effect the channel function, stream flow and basin hydrology.

Long-Term and Cumulative Effects

The differences in the amount of disturbances under this alternative compared to Alternative 2 would be too small to be measurable in a watershed level cumulative effects analysis. The proposed actions in this alternative would have similar long-term and cumulative effects as Alternative 2 and/or 3.

3.4.2.4.2 Watershed Restoration Projects on Matrix and RR lands

For all Watershed Restoration Projects:

The effects from proposed actions in this alternative would be same as those disclosed for Alternative 2.

3.5 Wildlife

3.5.1 Wildlife

3.5.1.1 Affected Environment

For information on the affected environment relative to Wildlife Species of concern see Appendix 10 - Wildlife Resource Biological Evaluation Plentywater Creek Project.

3.5.1.2 Environmental Consequences

For information on the environmental consequences relative to Wildlife Species of concern see Appendix 10 - Wildlife Resource Biological Evaluation Plentywater Creek Project.

3.5.2 Fish

3.5.2.1 Affected Environment

The Plentywater Creek project area is located within the Dairy Creek watershed which feeds into the Upper Willamette River via the Tualatin River. The Dairy Creek drainage is a 5th field watershed draining 231 square miles in the northern part of the Tualatin River Basin. The watershed contains the mainstem of Dairy Creek and three mainstem tributaries, the east and west forks of Dairy Creek and McKay Creek. The proposed timber harvest areas are located within five 6th field watersheds, Dairy Creek, Murtaugh-Big Canyon, Upper McKay Creek, East Fork McKay Creek and Lower McKay Creek. Approximately 4% of the land in the Dairy Creek 5th field watershed is in federal ownership.

Fish species found within the Dairy Creek watershed are listed in Table 9. Coho salmon are not native to the Dairy Creek watershed, but were introduced in the 1920's and now reproduce naturally within the watershed. In March of 1999, the upper Willamette ESU (evolutionarily significant unit) of steelhead, which includes the steelhead within the Dairy Creek watershed, were federally listed as threatened under the ESA (Endangered Species Act). Dairy Creek also falls within the Upper Willamette chinook salmon (*O. tshawytscha*) ESU area, however, chinook

are not known to inhabit this watershed, currently or historically. As of September 2000 all new projects must be considered as to their effects to species covered by the MSA, EFH, and a determination must be made of either "M**ay Adversely Affect**" or "**Would Not Adversely Affect**" EFH. Fish distribution within the Plentywater Creek Project, project area has been determined through presence/absence surveys conducted in 1997 - 1999. Though data on steelhead distribution in the Dairy Creek watershed is lacking, estimates based on limited data project that streams containing steelhead are located directly adjacent to several of the timber harvest units.

The major beneficial uses of water in Dairy Creek include domestic and municipal consumption, cold water fisheries, recreation, irrigation, manufacturing, livestock watering and wildlife (see Beneficial Uses, Appendix 7). An estimated 69 miles of stream in the Dairy Creek watershed are on the ODEQ water quality limited list. Water quality problems include excessive *E. coli* counts, high water temperature, low dissolved oxygen and low pH. All the listed stream segments are located downstream of the 6th field watersheds containing the proposed project locations.

The three salmonids present in the Dairy Creek watershed differ somewhat in their habitat, but all require cool water, structurally diverse channels and clean spawning gravel for maintenance of healthy populations. Less is known about the requirements of the non-salmonid species, however the same general habitat features are expected to benefit them as well. Large wood pieces play a vital role in maintaining channel complexity by creating scour to form pools, recruiting and maintaining spawning gravel, and providing cover. The *Dairy-McKay Watershed Analysis,* (BLM 1999), identified increased sedimentation and decreased large woody debris inputs as the major factors affecting salmonid habitat within the Dairy Creek watershed. Salmonid habitat, especially in the mainstems, is generally limited in the Tualatin Plain, and used mainly as migration corridors. The Tualatin Mountain portions of the drainage provide some quality salmonid habitat, however much of the habitat has been diminished due to past land management actions.

The East Fork of Dairy Creek above Greener Road is the area proposed for instream wood placement. In the past it provided some of the best fish habitat within the Tualatin Basin. A 1995 survey documented Pacific lamprey, cutthroat trout, steelhead trout and torrent sculpin in this stream reach. However, channelization of this stream reach during flood control efforts in 1996 removed large wood from the stream channel and substantially reduced the quantity and quality of habitat. Adding large wood pieces to this stream reach would help restore habitat for fish and other aquatic species.

Table 9. Fish Species and Status within the Dairy Creek Watershed

Common Name	Scientific Name	Status
Upper Willamette steelhead trout	*Oncorhynchus mykiss*	federally listed - threatened
Upper Willamette chinook salmon	*Oncorhynchus tshawytscha*	federally listed - threatened
cutthroat trout	*Oncorhynchus clarki*	
coho salmon	*Oncorhynchus kisutch*	introduced
Pacific lamprey	*Lampetra tridentatus*	Bureau sensitive
river lamprey*	*Lampetra ayresi*	Bureau sensitive
western brook lamprey	*Lampetra richardsoni*	
redside shiner	*Richardsonius balteatus*	
reticulate sculpin	*Cottus perplexus*	
torrent sculpin	*Cottus rhotheus*	

*presence not verified

Refer to Appendix 8, "Matrix of Pathways and Indicators," for additional discussion of the environmental baseline conditions.

3.5.2.2 Environmental Consequences

3.5.2.2.1 Alternative 1 (No Action)

Refer to Appendix 8, Matrix of Pathways and Indicators, for additional discussion of the environmental effects of this alternative, including any interrelated or interdependent actions, on relevant indicators. Refer to Appendix 9 and 11 for a discussion of the alternatives relative to the Aquatic Conservation Strategy Objectives.

3.5.2.2.1.1 Forest Management on Matrix and RR lands

No action would occur under Alternative 1, therefore no direct effects would occur to fish or fish habitat. The potential adverse impacts to fish and aquatic habitat that could occur if any of the action alternatives were implemented would be avoided. However, the net decrease in road mileage, which would result in an indirect beneficial effect to fish and aquatic habitat in the long term, would also not occur. As this is a "no action" alternative, no ESA call would be made.

3.5.2.2.1.2 Watershed Restoration Projects on Matrix and RR lands

Fish Habitat Enhancement: No direct or indirect effects would occur to fish or fish habitat in the Dairy Creek watershed. As this is a "no action" alternative, no ESA call would be made. Since all four of these projects are restoration and enhancement projects, indirect adverse impacts may result from not implementing them, though any short-term adverse impact would also be avoided. If the fish habitat enhancement project was not implemented, the short-term adverse impacts of placing wood in the stream channel, mainly increased turbidity during project implementation, would be avoided. However, many riparian areas within the Dairy Creek watershed lack conifers for future input of large wood. In the long-term, implementation of Alternative 1 would result in a reduction in fish habitat as the currently limited amount of large wood decomposes with little or no additional or replacement wood entering the system.

Wildlife Habitat Enhancement: The wildlife habitat enhancement project is not expected to adversely impact fish or aquatic habitat, therefore not implementing this project would not be expected to have any direct or indirect adverse impacts on fish and aquatic resources.

Campground Restoration: There is a possibility that not implementing the campground restoration project may result in increased sediment movement into the East Fork of Dairy Creek and increased turbidity due to runoff from disturbed and compacted surfaces. Generally the runoff would maintain at its current level, however, potential for increased use at this site may increase sedimentation from this area.

Road Stabilization: The road would not be stabilized, possibly resulting in sediment mobilization into streams. Though it is likely that the majority of the sediment that would move has done so already, there is a possibility of continued erosion during wet periods that could move sediment into the East Fork of Dairy Creek.

Cumulative Effects (Dairy Creek Watershed): The *Dairy-McKay Watershed Analysis*, (BLM 1999), identified increased sedimentation and decreased large woody debris inputs as the major factors affecting salmonid habitat within the Dairy Creek watershed. Salmonid habitat, especially in the mainstems, is generally limited in the Tualatin Plain, and used mainly as migration corridors. The Tualatin Mountain portions of the drainage provide some quality salmonid habitat, however much of the habitat has been diminished due to past land management actions. An estimated 69 miles of stream in the Dairy Creek watershed are on the ODEQ (Oregon Department of Environmental Quality) water quality limited list. Water quality problems include excessive *E. coli* counts, high water temperature, low dissolved oxygen and low pH. Numbers of Upper Willamette steelhead spawners have had a steep and continuing decline since 1988. The decline has been attributed mainly to destruction and modification of habitat, overutilization for recreational purposes, and natural and human-made factors (Federal Register: March 10, 1998, Vol. 63, No. 46, Proposed Rules, pp. 11797-11809). Though cutthroat trout are described as relatively abundant, it is likely that they are experiencing a downward trend for the same reasons

as steelhead. Trends for other fish species within the watershed are mostly unknown, but are suspected to be downward given the habitat limitations described above.

If the none of the action alternatives are implemented, potential adverse impacts would be avoided, however they are not expected to contribute to downward trends in fish populations. The beneficial effects of reducing road mileage within the watershed, restoring large wood to approximately one mile of stream, and restoration of a compacted area (campground) adjacent to the stream also would not occur, though the overall beneficial impacts to the watershed are relatively minor and are not expected to substantially affect overall trends in fish populations.

3.5.2.2.2 Alternative 2 (Proposed Action)

Refer to Appendix 8, "Matrix of Pathways and Indicators," for additional discussion of the environmental effects of this alternative, including any interrelated or interdependent actions, on relevant indicators. Refer to Appendix 9 and 11 for a discussion of the alternatives relative to the Aquatic Conservation Strategy Objectives.

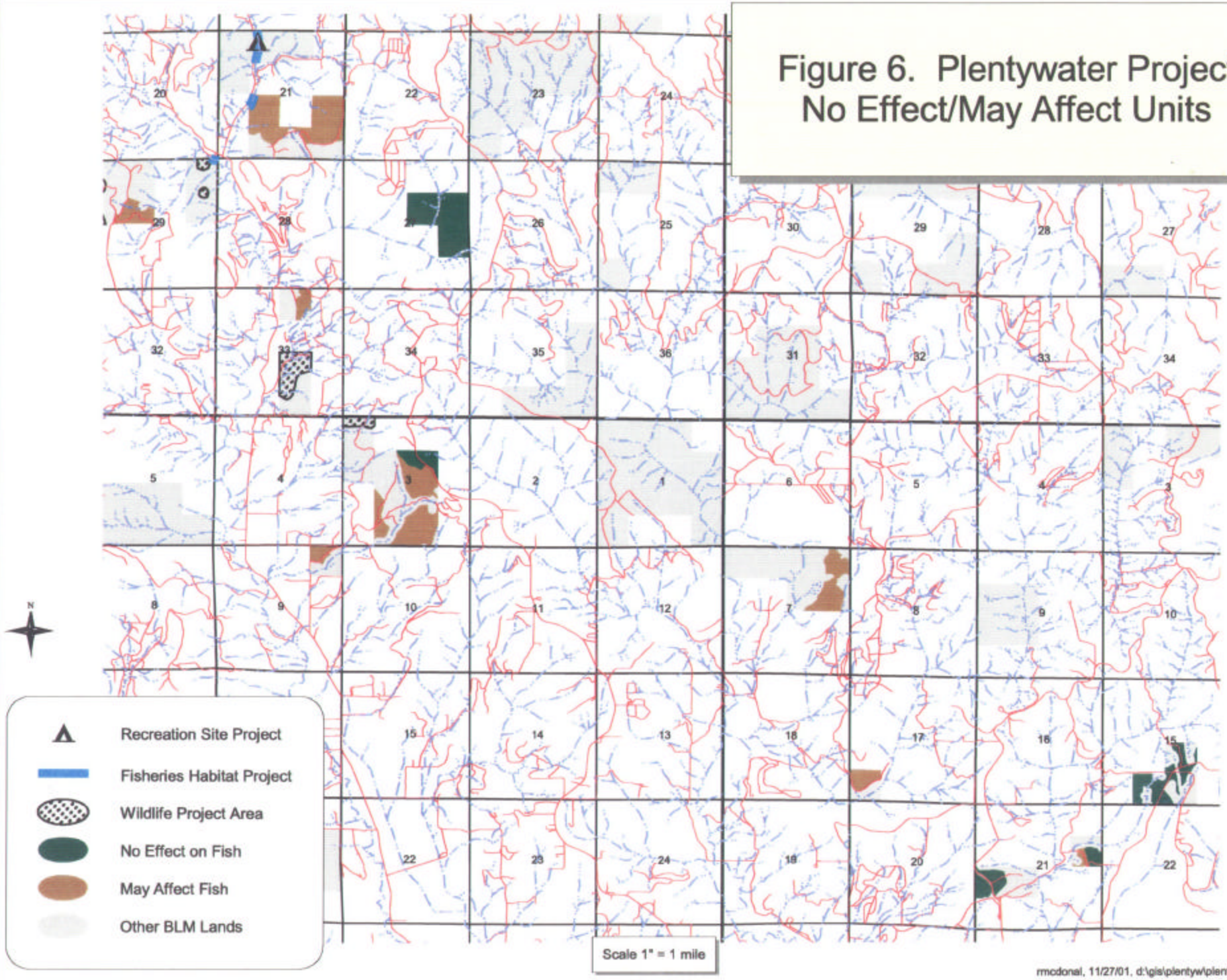
3.5.2.2.2.1 Forest Management on Matrix and RR lands

This alternative could result in sediment delivery to streams as a result of road building and decommissioning, yarding of logs and transporting logs, which could lead to indirect effects to fish and fish habitat. A portion of the timber harvest activities are expected to take place during the winter, when the potential of sediment moving into streams is most likely to occur. Potential impacts to aquatic habitat include turbidity and sediment above existing conditions and decreased pool quality due to excess sediment input. Impacts to fish may involve loss of reproductive success, loss of individuals from the population, and loss of habitat elements. The project includes the following actions which would minimize or eliminate sediment movement into streams: decommissioning of roads for a 5,700 foot net decrease in road mileage, decompaction of landings, decompaction of skid trails in the regeneration harvest units, rocking roads used during the wet season to avoid sediment run-off, a small amount of RR treated (approximately 37 acres), no-cut buffers along both fish bearing and non-fish bearing streams, no ground-based yarding equipment or skid trails allowed within RR, utilize existing skid trails to the greatest extent possible, limiting the number and width of new skid trails and cable yarding corridors, and restricting ground-based yarding to periods of low soil moisture (generally from July 1 through October 31). Log hauling and road building/decommissioning activities may result in short term increases in turbidity, but there should not be long term changes in stream sediment levels.

Portions of Alternative 2 would have varying affect calls for listed Upper Willamette steelhead trout, and it's designated critical habitat. Portions of units 15-1, 3-1, 21-2, 21-3, and 27-1 would have "**NE**" (**no effect**) on this species or its critical habitat (see Figure 6). The units that receive the NE call have several points in common: 1/ they are all in close proximity to paved roads for

hauling; 2/ there is no new road construction in RR; 3/ the stream distances to listed steelhead are

Figure 6. Plentywater Project No Effect/May Affect Units



greater than 0.5 miles; and 4/ the units would be harvested and hauling would occur in the dry season. Additional measures to further reduce the potential of sediment delivery to streams may include; 1/ spot rocking; and 2/ sediment traps in ditch lines with hydrologic ties to stream channels. Other measures as identified by resource area specialists may be utilized during the implementation phase of the project to further reduce impacts. The remaining proposed harvest units within this planning area would receive a "may affect" call. Taken as a group the call would be "**May Affect, Likely to Adversely Affect**," for Upper Willamette steelhead trout and it's critical habitat, however many of the harvest units have limited potential for impacts to listed steelhead or critical habitat and as such would fall into the "**NLAA**" (**Not Likely to Adversely Affect**) category if considered independently. The difference in affect calls is due to the potential for sediment entering streams during the various ground disturbing activities and the hauling of logs, as described above, some of which can be minimized or eliminated with project design features. The design features incorporated into the project make adverse impacts to upper Willamette steelhead and the other fish species found within the Dairy Creek drainage a low probability however some short term (three years or less) impacts could occur in a couple of locations. The locations that may have specific impacts include units 17-1, 3-2, 10-1 and 33-1. Units 3-2 and 10-1 both have culverts that, when replaced, may mobilize enough sediment to have impacts to ESA or MSA listed species. The haul route in this location is through RR as well. Unit 17-1 requires road building in RR which, due to its close proximity to the East Fork Dairy Creek, has more than a negligible potential of sediment delivery to this ESA and MSA occupied habitat. Unit 33-1 has the potential for sediment delivery if the currently washed out road is rebuilt and used for hauling. The harvest unit 33-1 is expected to be Regeneration harvest with thinning in RR.

The affect call for all units in the project for Upper Willamette chinook salmon, would be "No Effect" as chinook are not currently or historically known to inhabit this watershed.

Essential Fish Habitat as defined by the MSA covers all populations of coho and chinook salmon in this watershed. Coho salmon are known to be present in the project area. As described previously, chinook salmon are not known to use this watershed currently or historically and will not be discussed further. The planned use of both BMPs and other mitigation measures, as described in Chapter 2, should minimize impacts to coho salmon. Any impacts to coho are likely to be short term in nature and minimally affect their spawning, breeding, feeding or growth to maturity. The EFH determination for coho is "may adversely affect" for all units taken as a group not including the units that are specifically considered to be NE (ESA) to Upper Willamette steelhead trout these NE (ESA) units would likewise have "No Adverse Affect" to EFH.

3.5.2.2.2.2 Watershed Restoration Projects on Matrix and RR lands

Fish Habitat Enhancement: The fish project in Alternative 2 was proposed and designed to implement the Aquatic Conservation Strategy. The project is expected to enhance and restore fish habitat, riparian habitat, and water quality. Placement of large wood pieces would create

pool and backwater habitats, help sort and retain bedload material within the system, including gravel and cobble suitable for salmonid spawning, and help maintain and restore floodplain connections. The East Fork Dairy Creek portion of the project may also include removing a berm along the stream and opening a secondary channel that was blocked, which would allow that stream to better access its floodplain and create more complex habitat. Fish, particularly salmonids, would benefit through an increase in quality and quantity of spawning and rearing habitat. The instream work would result in some sediment delivery and turbidity within East Fork of Dairy Creek, which could lead to direct and indirect adverse impacts to fish and fish habitat in the short term. Sediment and turbidity would result from equipment access routes to and into the channel, instream operation of equipment, placement of logs instream, and removal of the berm. Increases in turbidity would be short-term, mainly during the actual instream work and possibly following the first major rainstorm after a project has been completed. Potential impacts to aquatic habitat include turbidity and sediment above existing conditions and short term decreased pool quality due to excess sediment input. The main direct adverse impact to fish would be the potential for short-term disruption of normal behavioral patterns (i.e. feeding and sheltering) as a result of increased turbidity. Adverse impacts to fish and fish habitat would be minimized by implementing instream work during summer low flow periods following the ODFW recommended instream work window, minimizing the number of equipment access points, and seeding and/or planting any areas disturbed as a result of the project work. Direct injury or mortality to fish could occur during placement of trees, and while equipment is operating instream. The probability of this occurring is low as fish will generally be able to move out of the way. The log source (trees) for the instream restoration portion of this project is expected to affect 1.5 acres in section 21. This action would require the falling, yarding, bucking, and hauling of approximately 20 trees (40 logs) to the project site. The impacts associated with this action were analyzed within the timer harvest portion of the alternatives, however if this action does not occur at the same time as the timber sale similar impacts are expected including soil displacement, compaction and road use. The use of ground-based equipment to move the logs from this harvest unit would be the same as if it was a harvest unit associated with a timber sale.

There is a potential for fuel or hydraulic fluids getting into the water, particularly while equipment is operating instream. Impacts to fish may be direct, causing injury or mortality through direct contact, or indirect by killing aquatic invertebrates that are the food supply for many fish species. Possibility of spills would be minimized or eliminated by daily checks of machinery for leaks. Impacts resulting from spills or leaks would be minimized by containment booms placed downstream of equipment during any instream work. Containment booms and other cleanup materials onsite would be a requirement for all contractors during instream or near stream work.

Overall, adverse impacts to fish, if they occurred, would be short-term. Adverse impacts may involve loss of reproductive success, loss of individuals from the population, and short term loss of habitat elements. Beneficial impacts would be both immediate and long-term. Due to the chance for short-term impacts that may result in ***take*** of Upper Willamette steelhead trout, the ESA call would be "**May Affect, Likely to Adversely Affect**". Due to the short term impacts to

water quality, the call for designated critical habitat for Upper Willamette steelhead trout and Upper Willamette chinook salmon would be "**May Affect, Likely to Adversely Affect**," however the overall impact to critical habitat would be beneficial. Potential adverse impacts would not result in a trend toward federal listing, nor would they lead to any loss in population viability of any fish species. Beneficial impacts would be expected to result in increased population viability of fish species within the Dairy Creek watershed.

EFH for coho would have the same impacts as described above in the ESA write up for Upper Willamette steelhead trout. As this action has some short term impacts the EFH portion would be "**May Adversely Affect**" however no other conservation recommendations are proposed as the action is designed to be beneficial to both coho and its habitat in the future.

Wildlife Habitat Enhancement: About half of the approximately 80 acres included in the wildlife habitat enhancement project would be in RR. The only potential adverse impact to aquatic habitat would be reduction of shading on streams through removal (felling) of some trees to help release others. Design features built into this project include no trees adjacent to streams would be felled if there would be a reduction in shading of the stream. Because of the potential for work to be done adjacent to streams, and a negligible potential for impacts to listed species, the ESA call would be "**May Affect, Not Likely to Adversely Affect**" Upper Willamette steelhead trout. There would be "**No Effect**" on designated critical habitat for Upper Willamette steelhead trout and Upper Willamette chinook salmon. This project would not negatively impact fish, other aquatic species or aquatic habitat, nor reduce population viability of any fish species within the Dairy Creek watershed.

EFH for coho would have the same impacts as described above in the ESA write up for Upper Willamette steelhead trout, as such "**No Adverse Affect**" to EFH is anticipated

Campground Restoration: The campground restoration project has the potential for short-term increase in sediment input to the stream channel and increased turbidity due to decompacting compacted ground near the stream. In the long-term the potential for increased sedimentation and turbidity would be reduced because decompacting and planting compacted areas would increase water infiltration and trapping of sediment. Planting native vegetation in the riparian area would help maintain and restore shading and future input of large wood to the stream channel. Due to the chance for short-term impacts that may result in ***take*** of Upper Willamette steelhead trout, the ESA call would be **"May Affect, Likely to Adversely Affect"**. Due to potential short term impacts to water quality, the call for designated critical habitat for Upper Willamette steelhead trout and Upper Willamette chinook salmon would be **"May Affect, Likely to Adversely Affect"**, however the overall impact to critical habitat would be beneficial. Potential adverse impacts would not result in a trend toward federal listing, nor would they lead to any loss in population viability of any fish species. Beneficial impacts would be expected to help maintain and increase the population viability of fish species within the Dairy Creek watershed.

EFH for coho would have the same impacts as described above in the ESA write up for Upper Willamette steelhead trout. As this action has some short term impacts the EFH portion would be "**May Affect**" however no other conservation recommendations are proposed as the action is designed to be beneficial to both coho and its habitat in the future.

Road Stabilization: This project is being proposed to help stabilize a road, BLM road 3N-33-3, which was damaged in the1996 floods. The areas that were eroded and are currently bare soil would be planted with a variety of native plants. A small amount of soil disturbance would occur during the planting. The planted vegetation should help cover and bind the bare soil surfaces, stabilize the gully and reduce the amount of sediment moving off the site. There are no direct impacts to fish anticipated if this project is implemented. Due to no adverse impacts expected, this project is expected to have "**No Effect"** on Upper Willamette steelhead trout, and "**No Effect**" on designated critical habitat for Upper Willamette steelhead trout and Upper Willamette chinook salmon. By reducing the potential for sediment moving off the site and eventually into streams, this project is expected to be beneficial for fish and aquatic habitat in the long-term. Beneficial effects would be expected to help maintain population viability of fish species within the Dairy Creek watershed.

The EFH call for this action would be "**No Adverse Affect**" as there is such small potential for any sediment movement from this project from planting and use of hand tools to stop sediment movement.

If it is determined that greater measures are necessary to address this area than use of hand tools and planting. For example the use of heavy equipment to address the problems in this action area may mobilize soils/ sediment in the short term resulting in an ESA call of **"May Affect-Likely to Adversely Affect"** for Upper Willamette steelhead and its critical habitat. The EFH call would likewise be "**May Adversely Affect**" for coho due to this action areas close proximity to Dairy Creek. This project is expected to be beneficial for fish and aquatic habitat in the long-term. Beneficial effects would be expected to help maintain population viability of fish species within the Dairy Creek watershed.

Cumulative Effects (Dairy Creek Watershed): The trends for fish species in the Dairy Creek watershed are the same as described under the Alternative 1. Future management actions on BLM land would be in accordance with the RMP which contains management direction to maintain or restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems, and to maintain or enhance fisheries potential. Since only 4.4% of the watershed is owned by the BLM, any action taken on federal land would have minimal impact on fish species and their habitats within the watershed. The BLM will likely pursue cooperative efforts with the Tualatin Watershed Council, private landowners and others to implement instream habitat improvements, which would lead to some improvement in aquatic habitat conditions throughout the watershed. In addition, the *Oregon Plan for Salmon and Watersheds* should lead to some improvement in aquatic habitat, though to what extent is unknown as this is a largely volunteer

effort. If Alternative 2 were implemented there would be potential short term adverse impacts from timber harvest activities and instream wood placement, and also long-term beneficial effects from a reduction in road mileage, and restoring large wood to approximately one mile of stream, and restoration of a disturbed/compacted area (campground) adjacent to the stream. Neither the potential adverse impacts or the beneficial effects are anticipated to alter the long-term viability of fish species at the watershed scale in the Dairy Creek watershed.

3.5.2.2.3 Alternative 3 (Soil and Water)

Refer to Appendix 8, "Matrix of Pathways and Indicators," for additional discussion of the environmental effects of this alternative, including any interrelated or interdependent actions, on relevant indicators. Refer to Appendix 9 and 11 for a discussion of the alternatives relative to the Aquatic Conservation Strategy Objectives.

3.5.2.2.3.1 Forest Management on Matrix and RR lands

Impacts to fish, other aquatic species and aquatic habitat would be similar to those described under Alternative 2. Design features of this alternative that further minimize impacts as compared to Alternative 2 include more of the timber harvest activities taking place during the dry season, more of the thinning areas designated as cable harvest instead of ground-based harvest, less overall acres harvested (about 60 acres less), and more road mileage decommissioned after timber harvest is complete (10,200 feet as compared to 5,700 feet in Alternative 2). Less activity during wet periods of the year will help reduce amount of sediment that could move into streams. More cable harvest in thinning areas and greater reduction in road mileage will help reduce the amount of compacted soil, which will help maintain subsurface flow of water and reduce potential for increased runoff and associated sedimentation.

If Alternative 3 was implemented, the ESA call for listed Upper Willamette steelhead trout, and for designated critical habitat for both Upper Willamette steelhead trout and Upper Willamette chinook salmon, would still be "**May Affect, Likely to Adversely Affect**" due to potential of sediment entering streams during the various ground disturbing activities and hauling of logs as described for Alternative 2. The additional design features incorporated into the project under this alternative make adverse impacts to upper Willamette steelhead and the other fish species found within the Dairy Creek drainage a low probability, and make this alternative less likely to impact aquatic species and habitat than Alternative 2.

3.5.2.2.3.2 Watershed Restoration Projects on Matrix and RR lands

The effects of implementing this group of projects under Alternative 3, would be the same as those described under Alternative 2.

Cumulative Effects (Dairy Creek Watershed): Cumulative effects would not differ substantially from what is described under the analysis for Alternative 2.

3.5.2.2.4 Alternative 4 (Urban Interface)

Refer to Appendix 8, "Matrix of Pathways and Indicators," for additional discussion of the environmental effects of this alternative, including any interrelated or interdependent actions, on relevant indicators. Refer to Appendix 9 and 11 for a discussion of the alternatives relative to the Aquatic Conservation Strategy Objectives.

3.5.2.2.4.1 Forest Management on Matrix and RR lands

This alternative would drop units 15-1, 17-1, 21-2, and 21-3 from proposed harvest, while the remaining units could be harvested as described under Alternative 2 or Alternative 3, or a combination. This would result in 120-150 less acres overall harvested, approximately 80 acres of which would have been regeneration harvested under Alternatives 2 and 3. Reduction in road mileage could be from 3,000 feet to 8,000 feet, less than under Alternative 3. The potential for adverse impacts to fish and aquatic resources from timber harvest activities under this alternative are similar to those described for Alternative 2 and/or 3. The acreage harvested would be substantially less, which would reduce the probability that adverse impacts would occur. The reduction in road mileage would vary, but in either case it would be less than described under Alternative 3.

If Alternative 4 was implemented, the ESA call for listed Upper Willamette steelhead trout, and for designated critical habitat for both Upper Willamette steelhead trout and Upper Willamette chinook salmon, would still be **"May Affect, Likely to Adversely Affect"** due to potential of sediment entering streams during the various ground disturbing activities and hauling of logs as described for Alternative 2 and 3. The design features incorporated into the project under this alternative (as described under either Alternative 2 or Alternative 3) make adverse impacts to upper Willamette steelhead and the other fish species found within the Dairy Creek drainage a low probability, and less acres harvested may make this alternative less likely to impact aquatic species and habitat than Alternative 2 or 3.

3.5.2.2.4.2 Watershed Restoration Projects on Matrix and RR lands

The effects of implementing this group of projects under Alternative 3, would be the same as those described under Alternative 2.

Cumulative Effects (Dairy Creek Watershed): Cumulative effects would not differ substantially from what is described under the analysis for Alternative 2.

3.6 Rural Interface (Major Issue)

3.6.1 Affected Environment

Approximately 120 acres in T.2N. R.2W. sections 15, 17 and 21 W.M. are Matrix lands located in the managed Rural Interface (RMP page 39, Table 3). The Dairy-McKay Creek WA indicates that the BLM lands in this area provide limited access to both consumptive and non-consumptive recreational opportunities such as hunting, mushroom collecting, hiking and horseback riding. The WA also identifies the potential for conflict with local land owners resulting from potential illegal dumping. Private lands in the area supports rural homes as well as Christmas tree farms, grape vineyards, non-industrial private forests and industrial private forest lands. Five concerns were raised during scoping that focused on Section 21, within the Rural Interface Area: 1) Potential dust generation from log hauling on Solberger Road which is a gravel surfaced County road; 2) Potential dumping on semi-permanent roads built to support harvest operations; 3) potential damage to the Solberger Road resulting from harvest related traffic; and 4) increased criminal activity resulting from increased visibility from Solberger Road.

3.6.2 Environmental Consequences

3.6.2.1 Alternative 1 (No Action)

Implementation of Alternative 1 would result in a continuation of the current situation. No harvest activity would occur and no harvest related roads would be built, nor would any existing roads be decommissioned. Therefore, it would not result in any harvest related modifications related to dust, traffic, potential dumping or increased visibility leading criminal activity.

Cumulative Effects: Traffic and dumping would continue at the current levels with probable increases due to the expanding population in the Hillsboro/North Plains area. Increased urbanization in these areas may increase the recreational use of the area as well as increase the incidence of illegal dumping and criminal activity. Federal and County Law Enforcement would continue and is expected to control the situation.

3.6.2.2 Alternative 2 (Proposed Action)

3.6.2.2.1 Forest Management on Matrix and RR lands

Units 21-2, 21-3 are proposed for regeneration harvest. The project design features include mitigation measures to reduce any potential increase in dumping and criminal activity generated by the project (Chapter 2). These features consist of items such as retention of a visual buffer along Solberger Road and subsoiling, blocking and planting all semi-permanent, reconstructed roads and skid trails in these units and obliteration of one existing road in Unit 21-3. Road damage is not expected to occur because the weight capacity of the County roads in the area exceed the weight of loaded log trucks. Potential dust generation and/or road wear or damage resulting from log hauling and other harvest related traffic on Solberger Road cannot be mitigated due to the Comptroller Generals decision prohibiting the expenditure of appropriated funds on county facilities (Project Record Document 67).

Local residences indicate that approximately 200 vehicles use Solberger Road on a typical day (Project Record Document 54). The Washington County traffic count data base indicates that approximately 61 vehicles use Solberger road daily (Project Record Document 117). It is estimated that approximately 975 ***MBF*** of timber would be extracted from Unit 21-2. The maximum load capacity of a log truck is approximately 5,000 board feet, which would mean that approximately 195 log loads would be hauled along Solberger road, provided that the timber purchaser hauls the entire harvested volume north. In addition to log hauling traffic, it is estimated that support personnel would account for up to 10 vehicles per day using Solberger Road.

It is expected that logging Unit 21-2 would take approximately 39 days (1 acre/day x 39 acre Unit), which would result in up to 390 vehicle uses for support personnel for the expected harvest period. When added to the logging truck traffic there would be a total of 585 vehicles using Solberger Road during the estimated 39 day harvest period (195 log loads + 390 support vehicle uses). Using the estimate of 200 vehicles per day provided by the local residences the average total vehicle use during this 39 day period would be 7,800. The harvest activity would increase this to 8,385, an increase of 7.5%.

Using the Washington County traffic count of 61 vehicles per day, there would be an expected 2,379 vehicles using Solberger road during the estimated 39 day harvest period. When added to the harvest related traffic there would be a total of 2,964 vehicles using Solberger road during the

harvest period. Therefore, using Washington County numbers, harvest activity would result in an increase in traffic of 24% during the 39 day harvest period.

It is expected that dust would be generated by harvest and log hauling activity. However, dust generation is expected to be localized and short-term, returning to normal levels following the completion of harvest and log hauling activity.

Road Damage: The major roads in the area are County roads and under the jurisdiction of Washington County Road Department. While no road damage is expected due to the rated weight capacity of these roads, any damage to these roads resulting from log hauling activity would be the responsibility of Washington County. BLM is expressly prohibited from expending appropriated funds for the maintenance and repair of county facilities.

Dumping: Following completion of harvest activity new natural surfaced spurs constructed to gain access behind the planned visual buffer along Solberger Road would be subsoiled and blocked. In addition the currently existing road in Unit 21-3 would be subsoiled and blocked. BLM law enforcement would continue to maintain it's presence as would Washington County Sheriffs patrols. Therefore illegal dumping is not expected to result from this action.

Visibility resulting in criminal activity: To reduce visibility in the project area a buffer is planned to be retained along Solberger Road. Therefore, criminal activity as a result of our action is not expected.

Cumulative Effects: Following completion of harvest activity, traffic and related dust production would return to pre-harvest levels. Sub-soiling and blocking temporary roads and an 800 foot segment of existing road in Unit 21-3, combined with a regular law enforcement presence is expected to reduce any potential increase in dumping. Criminal activity would be expected to follow current trends for the region as urbanization increases.

3.6.2.2.2 Watershed Restoration Projects on Matrix and RR lands

The proposed watershed restoration projects all occur in the East Fork of Dairy Creek watershed. Lands in the Rural Interface area are located in the McKay Creek watershed. Therefore, the watershed restoration projects are expected to have little to no influence on the lands in the Rural Interface Area.

Cumulative Effects: There would be no cumulative effect of these projects on the Rural Interface Area.

3.6.2.3 Alternative 3 (Soil and Water)

3.5.2.3.1 Forest Management on Matrix and RR lands

The effects of implementing Alternative 3 on the Rural Interface Area would be similar to those under Alternative 2. This is because under both alternatives the same treatment is applied to Units 21-2, 21-3 and 15-1. Unit 17-1 would not be treated under this alternative.

Cumulative Effects: The cumulative effects of Alternative 3 would be similar to those described under Alternative 2.

3.6.2.3.2 Watershed Restoration Projects on Matrix and RR lands

The impacts of these projects is expected to be similar to those identified under Alternative 2, the proposed action.

Cumulative Effects: The cumulative effects of Alternative 3 are expected to be similar to those described under Alternative 2.

3.6.2.4 Alternative 4 (Rural Interface)

3.6.2.4.1 Forest Management on Matrix and RR lands

The impacts on the Rural Interface resulting from implementation of Alternative 4 would be similar to the Alternative 1. Alternative 4 would implement the features of either Alternatives 2 or 3, but would defer treatment of the lands within the Rural Interface at this time. These lands would remain in the Matrix land use allocation and may be treated at some time in the future. There is the potential that Solberger Road could be paved in the future which would eliminate the potential dust generation.

Cumulative Effects: Implementation of Alternative 4 would result in similar cumulative effects as those described under Alternative 1. This is because no activity would occur within the Rural Interface Area.

3.6.2.4.2 Watershed Restoration Projects on Matrix and RR lands

The impacts of these projects is expected to be similar to those identified under Alternative 2, the proposed action.

Cumulative Effects: The cumulative effects of Alternative 4 are expected to be similar to those described under Alternative 2.

3.7 Conformance With Land Use Plans, Policies, and Programs

Alternative 1 (No Action), Alternative 2 (Proposed Action), Alternative 3 (Soil and Water), and Alternative 4 (Rural Interface), unless otherwise noted, are in conformance with the following documents which provide the legal framework, standards, and guidelines for management of BLM lands in the Tillamook Resource Area:

* *Salem District Record of Decision and Resource Management Plan,* May 1995, pp 5-6 (ACS Objectives), 9-11 (RR), 20-22 (Matrix), 22 (Air Quality), 22-24 (Water and Soil), 24-27 (Wildlife Habitat), 28-32 (Special Status Species and Habitat), 36 - 37 (Visual Resources), 41-45 (Recreation), 46-48 (Timber Resources Objectives), 49-50 (Special Forest Products), 62-64 (Roads), 64-67 (Noxious Weeds and Fire/Fuels Management), 39 (Rural Interface) and Appendix C pp. C1-C11 (Best Management Practices).

    - ACS Objectives and RR Objectives: All of the action alternatives are predicted to result in the maintenance and/or restoration of ACS objectives (Appendix 9 and 11). All of the alternatives would be expected to meet the Riparian Reserve objective to "provide habitat for special status, SEIS special attention and other terrestrial species.@ The Alternative 2, which thins approximately 37, Alternative 3 which thins approximately 26 acres and Alternative 4 which thins a range between approximately 20 and 37 acres of RR would result in a more diverse, wider array of habitat types within the RR as the treated portions respond to the thinning with increased windfirmness, growth and vigor. The watershed restoration projects would help to "restore the ecological health of the watershed" (S&G B-9). The design features incorporated into each of the individual projects proposed in the action alternatives would help minimize the risk of adverse impacts to populations of concern.

    - Matrix Objectives: Alternatives 2, 3 and 4 contribute toward meeting the objective to "produce a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability." This is accomplished through timber volume being offered for sale; firewood being offered to the public if slash accumulations at landings warrant; management of forest stands to reduce root rot infestations; regenerating or developing forests which have desired species composition, structural characteristics and distribution of seral or age classes. Alternative 1 (No Action) would not be meeting this objective because it would not contribute towards a "sustainable supply of timber" (timber volume would not be offered for sale at this time, firewood would not be offered, and active management would not occur in the root rot infected stands, overstocked conifer stands or hardwood dominated stands, thus, tree survival and growth which would lead to a "sustainable supply of timber" would not be promoted).

Provide Connectivity between Late-successional Reserves. Project design features assure the project is consistent with this general objective. These design features include but are not limited to providing snag, green tree and down wood habitat features within the regeneration unit, as well as providing no-cut buffers along streams, and thinning stands in both Riparian Reserve and Matrix land allocations to promote tree growth, crown development and increase the treated stand=s general health and vigor.

Provide habitat for a variety of organisms associated with both late-successional and younger forests. Project design features assure the project is consistent with this general objective. These design features include but are not limited to providing snag, green tree and down wood habitat features within the regeneration unit, as well as thinning stands in both Riparian Reserve and Matrix land allocations to promote tree growth, crown development and increase the treated stand=s general health and vigor.

All of the alternatives are consistent with the Matrix objective to Aprovide for important ecological functions . . . and maintenance of ecologically valuable structural components such as down logs, snags, and large trees@. The action alternatives meet these objectives through project design features to retain green trees, snags and existing down woody debris. The no action alternative is believed to be consistent with this objective through more passive management; the existing structural components would be retained and additional components would be added as natural processes continue to occur at approximately the current rate.

Provide early successional habitat (RMP p 20). The regeneration harvest of hardwood dominated stands and stands with high levels of root disease and subsequent reforestation with conifer and/or disease resistant species will provide some early successional habitats.

- Air Quality Objectives: Prescribed burning of harvest units or burning of slash at roads and landings would adhere to smoke management/air quality standards.

- Water and Soils Objectives: Applicable Best Management Practices as described in the RMP, (Appendix C1-C11) are incorporated into the project design for the action alternatives and assure the maintenance of water quality and reduce the impacts to soil productivity while meeting other resource management objectives.

  The watershed restoration projects would help improve water quality and soil productivity as well as help restore proper riparian habitat function and sediment transport.

- Wildlife Habitat Objectives: Project design features of the action alternatives assure consistency with wildlife habitat objectives. These design features include but are not limited to providing snag, green tree and down wood habitat features within the regeneration unit, as well as requirements to protect existing CWD.

  The wildlife habitat enhancement projects are designed to "Enhance and maintain biological diversity and ecosystem health in order to contribute to healthy wildlife populations" (RMP p 24).

- Special Status and SEIS Special Attention Species and Habitat Objectives:

  All of the alternatives are predicted not to contribute to the need to list or elevate their status to a higher level of concern (Appendix 5 and 10).

- Visual Resources Objectives: All of the alternatives are consistent with the visual resources management objectives specified in the RMP (pp. 36,37).

- Rural Interface Areas: Proposed operations in the Rural Interface Areas considered local land owners and residences during analysis and planning. The project also includes design features to "minimize the possibility of conflicts between private and federal land management" (RMP p. 39).

- Timber Resources Objectives: All of the action alternatives are predicted to result in the attainment of applicable Timber Resource Objectives based upon the fact that they would help contribute toward a sustainable supply of timber through implementing a prescription which would promote tree survival and growth. Timber stands would be managed to reduce the risk of loss to fire, animal, insects disease. Alternative 1 (No Action) would not be meeting these objectives because it would not contribute towards a "sustainable supply of timber" (timber volume would not be offered for sale at this time, firewood would not be offered, and active management would not occur in the root rot infected stands nor overstocked conifer stands, thus, tree survival and growth which would lead to a "sustainable supply of timber" would not be promoted).

- Special Forest Products Objectives: All of the action alternatives are predicted to result in the attainment of applicable Special Forest Products Objectives based upon the fact that they would result in firewood being offered for sale to public if sufficient quantities are located on or near roads and landings. Alternative 1 (No Action) would not be meeting these objectives because it would not contribute toward the production and sale of special forest products.

- Noxious Weeds: Some degree of noxious/exotic weed spread and introduction is expected to be associated with vehicle traffic. However, control measures are

planned and it is expected that weed presence would decline once the natural vegetation becomes established again (see Appendix 5).

Alternatives 2, 3 and 4 contain design features to reduce the potential introduction and spread of noxious weeds (Chapter 2).

- Fire/Fuels Management: Alternatives 2, 3 and 4 contain fuel management activities that would be conducted in such a manner as to adhere to smoke management/air quality standards (Appendix 1) and meet ACS objectives.

- Best Management Practices: Alternatives 2, 3 and 4 contain applicable Best Management Practices described in Appendix C1-C8 of the RMP.

* *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (April, 1994).*

- The RMP is consistent with the Record of Decision (*Salem District Resource Management Plan/Final Environmental Impact Statement, September, 1994,* Chapter 4-96). Since all of the action alternatives are consistent with the RMP, these alternatives are believed to be consistent with the Record of Decision.

* *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, January, 2001.*

- The project is consistent with the Record of Decision (*Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines.*)

* *Dairy-McKay Creek Watershed Analysis*: The *Dairy-McKay Watershed Analysis* (Washington County Soil and Water Conservation District and USDI Bureau of Land Management, 1999), supports the proposed activities. Recommendations contained on pp 109 - 116 of the WA were considered in the development the Plentywater Creek Project action alternatives. Some of these recommendations are listed below.

Activities within the Riparian Reserve land allocation. Recommendations for terrestrial species and habitat include: "Maximize the current and future benefits derived from RR . . . for cavity dwellers and other species dependent upon late seral stage habitat features. Evaluate LSR stands under 80 years old and RR acres and consider the application of silvicultural prescriptions to benefit the development of late-seral stage habitat. Potentially beneficial treatments include thinning to encourage rapid growth and enhance development of late seral stage habitat . . .@ and "When implementing silvicultural

prescriptions in RR, consider use of logging systems and site preparation methods that would reduce site disturbance, and maintain a no-cut buffer appropriate to site specific conditions along stream channels.@ (p. 110-111). Recommendations for forest resources include: "Consider thinning well-stocked and over-stocked mid-aged conifer stands in RR to accelerate size development and promote windfirmness in remaining conifers. Variable-density thinnings could also be used to enhance structural complexity of relatively dense conifer stands." (p. 111).

Activities within the Matrix land allocation Recommendations for forest resources issues include: "General priorities for selecting stands for regeneration harvest in Matrix allocations - 1) Pure Douglas-fir stands where more than 25 percent of the area is in *P. weirii* disease centers; 2) Hardwood stands growing on conifer sites where soil compaction is no longer a threat to conifer growth; 3) Mixed hardwood-conifer stands growing on conifer sites where soil compaction is no longer a threat to conifer growth. This priority is particularly applicable to the GFMA portion of the Matrix; 4) Over stocked conifer stands that are no longer suitable for commercial thinning; 5) Conifer stands that have reached or are beyond their peak volume production (culmination of Mean annual increment). This priority is particularly applicable to the GFMA portion of the Matrix.@ also "General criteria for selecting stands for commercial thinning in the GFMA - top priority for commercial thinning should go to Douglas-fir stands that are 30 to 60 years old which have the following characteristics: 1) Curtis Relative Density levels in the general range of 55 to 70; 2) live-crowns on residual trees of 30 percent or more; 3) less than 20 percent in *P. weirii* root rot centers.@ (p. 113).

Rural Interface Recommendations for actions in the Rural Interface include that "To the extent Possible" we should: "Consult community groups and affected land owners during the scoping phase of the environmental assessment process for BLM projects;" "as well as keeping local publics apprised of BLM activities."

Road Construction and Decommissioning Recommendations for Erosion issues include the following: "Where appropriate, reduce existing soil compaction levels by obliterating roads that are not needed for future management and by treating old compacted areas such as dirt roads and cat trails with a winged subsoiler.@ As well as "Identify road-related sediment problems, such as . . . failing water crossing structures . . .. Evaluate the potential for sediment delivery from these sources to determine whether it is appropriate to fix the problem@ (p. 109). Recommendations for water quality issues include the following: "Where feasible, avoid road-building activities within RR. Where these activities are necessary, use practices that minimize hazards to the aquatic system@ (p. 109). Recommendations under sediment and Erosion (Preventative Measures) include "Incorporate considerations related to slope, soils, habitat objectives, and hydrologic function into the decision-making process when placing roads near RR@ (p. 116). Recommendations for forest resources include: "Carefully evaluate the trade-off between relieving soil compaction and root damage to residual trees before recommending

subsoiling in commercial thinned stands.@ (p.113)

* *Middle Tualatin-Rock Creek Watershed Analysis*: The *Middle Tualatin-Rock Creek Watershed Analysis* (Washington County Soil and Water Conservation District and USDI Bureau of Land Management, 2001), supports the proposed activities. Recommendations contained on pp 115 - 121 of the WA were consistent with the Plentywater Creek Project action alternatives. Some of these recommendations are listed below.

  Silviculture: Portions of this Section 15 would be converted from hardwood to conifer.

  Botany: English Ivy eradication project: Eradicate English Ivy that has become established in Section 15.

* *Coastal Zone Management Act*, as amended: The project area is **not** located within Oregon=s Coastal Zone boundary. However, the proposed action appears to be consistent with the applicable statewide planning goals identified in the Oregon Coastal Management Program.

* *Oregon Forest Practices Act*: All of the alternatives are consistent with the Oregon Forest Practices Act. Various project design features within the alternatives assure this compliance; some of these features include but are not limited to the maintenance of RR, and a regeneration harvest unit which is less than 120 acres in size, contains an adequate number of wildlife trees, with plans for reforestation to occur in a timely manner (Chapter 2.3).

* *Endangered Species Act*: As per BLM State Office Instructional Memorandum No. OR-97-061, the applicable Reasonable and Prudent Measures/Conservation Recommendations contained within the National Marine Fisheries Service March 18, 1997 Biological Opinion and Conference Opinion were incorporated into the design features of Alternatives 2, 3 and 4 (Chapter 2.3).

  Section 7 Consultation with the National Marine Fisheries Service has been completed for the restoration projects included as a portion of the proposed action. These restoration projects are consistent with the requirements contained in Programmatic Biological Opinion dated July 28th 1999, which is still active under incidental take statements. A portion of the timber sale actions contained in the proposed action do not require ESA Section 7 consultation due to a "No Effect" call for fish. The remainder of the timber sale actions would require project level consultation with NMFS due to a "May Affect" call for ESA and MSA listed fish.

  This project was included within the North Coast Province Programmatic Biological Assessment for Fiscal Year 2001 Projects which would Modify the Habitats of Bald Eagles, Northern Spotted Owls and Marbled Murrelets which was submitted to the U.S.

Fish and Wildlife Service and dated September 9, 1999. A Biological Opinion covering this project was received from USFWS dated October 26, 1999 (FWS # 1-7-00-F-649). In a letter dated August 1, 2001 USFWS granted a one year extension for Biological Opinion, thus covering this Fiscal Year 2002 project. Consultation is completed for those proposed actions complying with the terms and conditions of this BO. Actions which do not comply with the terms of this BO would require specific consultation prior to project implementation.

* *Magnuson-Stevens Fisheries Conservation and Management Act*: As per Instruction Memorandum number 2001-158 BLM is required to comply with the consultation requirement contained in the *Magnuson-Stevens Fisheries Conservation and Management Act.* This project is in compliance (see Chapter 3).

3.8 Additional Recommendations Not Part of the Alternatives

3.8.1 Soil Resource

3.8.1.1 Mitigating Measures and Rationale

Measure 1: Following harvest, skid trails that could be easily accessed by off-road motor vehicles including OHVs would be blocked where practical and closed to public. If slash is available, it would be placed over the road and skid trail surfaces at appropriate locations to discourage off-road vehicle use.

Rationale for Measure 1: Portions of the project area is located within or close to urban interface. Some skid trails would be located near existing public and private roads that could be easily accessible by off-road motor vehicles. If not blocked, these trails would allow off-road vehicle access into the forest. This would result in additional ground disturbance, erosion, compaction and possibly other negative impacts such injuring vegetation, degrading water quality, illegal dumping and vandalism. This measure should help deter off-road motor vehicles use on sensitive at a low cost.

Measure 2: For areas to be ground based yarded, especially in areas with slower draining and slower drying soils (in most of Unit 15-1 and portions of Units 3-1, 2, 3 and Unit 21-1), it is strongly suggested that the timber be left standing as close to the time of yarding as possible. Consider the use of low-ground pressure harvest equipment such as a harvester/forwarder systems.

Rationale for Measure 2: Project soils have high silt contents and are sensitive to compaction. The soils are usually moist, but are dry in the upper profile generally July 15 to October 15. Some project soils are slower draining due to the presence of a restrictive subsoil

layer (fragipans) or topographic position (e.g., in depressions or near a stream).

If trees are cut early in the growing season, they will no longer remove soil moisture through transpiration. Downed wood would also function as a mulch, greatly reducing evaporation and thereby increasing the time the soil will remain wet or moist. For these soils, cutting trees before the growing season typically delays the low moisture period by approximately one month.

The likelihood of severe compaction is increased by harvesting trees on slower drained soils early in the season. If they become compacted, they could stay wet for long periods potentially increasing unwanted vegetation and reducing forest productivity.

Measure 3: Any additional fill material in ditch along the 2N-2-18 road as a result of forest practices should be removed prior to fall rains when water can collect in the ditch.

Rationale for Measure 3: Pulling timber down short steep slopes in Unit 17-1 onto 2N-2-18 road could increase erosion and potentially destabilize the hillslope and move sediment into the adjacent road ditch. The ditch is directly connected to an intermittent stream. During a large storm event, sediment could be transported downstream down the ditch, in the intermittent stream and into East Fork McKay Creek.

Measure 4: Place a short windrow or low berm of soil/ unmerchantable logs/ slash across a small swale along the southern property boundary of Unit 21-2. Restrict ground-based equipment from 75 feet of the small swale along the southern boundary.

Rationale for Measure 4: There is a small, but unlikely, risk of a small amount of sediment generated from operating harvesting activities could run-off the south boundary of Unit 21-2 and deposit in a swale onto the adjoining private property. This would be an easy, low cost measure to further protect the adjacent property owner from this risk.

3.8.1.1 Expected Impact Review

Measure 1 places additional emphasis on the project design features "common to all units" which are described in Chapter 2.3.2.1 of this EA.

Special Status/Noxious Weeds: Implementation of this measure is not expected to have any effects on the vegetative resources beyond what is currently analyzed under the proposed action and alternatives.

Forest Management: Implementation of this measure is not expected to have any effects on the vegetative resources beyond what is currently analyzed under the proposed action and alternatives.

Wildlife: Implementation of this measure is not expected to have any effects on the wildlife resource beyond what is currently analyzed under the proposed action and alternatives.

Fish: This proposed mitigation measure, the blocking of skid trails that could be accessed by motor vehicles after harvest where practical would have beneficial effects to fisheries resources by reducing the time frame these areas are in use and be consistent with the NMFS recommendations to use "roads" for the shortest time frame possible. While this action would be beneficial it would not change the effect of any of the alternatives enough to change the current unit of measure (affect call).

Soil and Water: Blocking easily accessible roads and skid trails would deter off-road motor use and resource damage. The amount of resource damage (soil disturbance, compaction, vegetation damage, streams degraded, visual esthetics, illegal dumping and vandalism) the measure would protect is likely to be small in area, but larger than usual for similar size projects due to the close vicinity of urban areas.

Measure 2 This measure may allow a longer ground based yarding season because it would allow the soil to reach low moisture levels sooner.

Special Status/Noxious Weeds: Implementation of this measure is not expected to have any effects on the vegetative resources beyond what is currently analyzed under the proposed action and alternatives.

Forest Management: Implementation of this measure is not expected to have any effects on the vegetative resources beyond what is currently analyzed under the proposed action and alternatives.

Wildlife: Implementation of this measure is not expected to have any effects on the wildlife resource beyond what is currently analyzed under the proposed action and alternatives.

Fish: This proposed mitigation measure, the reduction of soil compaction through delaying harvest (unit 15-1) in ground based harvest units until just before removal. This action could have long term benefits as the amount of compaction on the ground could be lower. This measure may provide water quality benefits, however no change to the affect calls of any of the alternatives is expected.

Soil and Water: Cutting trees close to the time of yarding will lengthen the time that the soils are dry thereby increasing the time that ground-based equipment would be allowed and reducing the potential for soil compaction.

Measure 3 This measure places emphasis on the need to clean road side ditches during winter road maintenance.

Special Status/Noxious Weeds: Implementation of this measure is not expected to have any effects on the vegetative resources beyond what is currently analyzed under the proposed action and alternatives.

Forest Management: Implementation of this measure is not expected to have any effects on the vegetative resources beyond what is currently analyzed under the proposed action and alternatives.

Wildlife: Implementation of this measure is not expected to have any effects on the wildlife resource beyond what is currently analyzed under the proposed action and alternatives.

Fish: Implementation of this measure is not expected to have any effects on the fish resource beyond what is currently analyzed under the proposed action and alternatives.

Soils: There is a high potential that sediment produced from logging a very steep (>70%) hillslope will collect in a road side ditch. If the ditch is not cleaned before winter rains, it is likely some of the sediment will be transported via an intermittent stream into East Fork McKay Creek**.** This measure will reduce the amount of sediment into East Fork Creek but will not eliminate it because there is an additional risk of erosion and mass movement after the ditch is cleaned.

Measure 4 This measure may reduce potential impacts to adjacent property owners within the Rural Interface area.

Special Status/Noxious Weeds: Implementation of this measure is not expected to have any effects on the vegetative resources beyond what is currently analyzed under the proposed action and alternatives.

Forest Management: Implementation of this measure is not expected to have any effects on the vegetative resources beyond what is currently analyzed under the proposed action and alternatives.

Wildlife: Implementation of this measure is not expected to have any effects on the wildlife resource beyond what is currently analyzed under the proposed action and alternatives.

Fish: Unit 21-2 this measure to place a small soil berm/logs or slash across a swale, would not alter any of the affect calls in any of the action alternatives.

Soils: This measure should essentially eliminate the risk of surface runoff and sediment that could by logging activities on BLM land onto the adjacent private land.

3.8.2 Wildlife Resource

3.8.2.1 Mitigating Measures and Rationale

Measure 1: Within unit 27-1, retain all of the reserve trees needing to cut to construct the yarding corridors within the two segments of Riparian Reserve which total approximately 14 acres. It is estimated that this would result in an average of approximately 3 reserve trees per each of the expected 15 corridors being retained on site for CWD (~45 trees on 14 acres or ~3 trees /acre).

Rationale for Measure 1: The long-term benefits associated with thinning include promoting the development of some late-seral stage habitat features, most notably large trees. Within the Plentywater Creek project area, these benefits would be expected to be longer-lived or greater within the up to approximately 37 acres of thinning proposed within the RR based upon the likelihood of the future regeneration treatments to occur within the Matrix land allocation. These benefits take on added meaning recognizing the general lack of late-seral habitat within the watershed, and the expectation that the vast majority of the lands within the watershed will continue to be managed in such a way as to preclude the development of habitat for late-seral stage species.

In general, the majority of the forested stands within the area lack CWD; this would be expected given the stand ages. However, under natural conditions, (without treatment) the CWD levels within the stand would be expected to increase greatly over the next few decades as a result of suppression mortality. Thinning will largely prevent this pulse in CWD recruitment although in the longer-term, it will allow for larger trees (future CWD) to develop sooner than without treatment. Retaining some material at the time of harvest would help assure that the CWD habitat component would be present within the stand in the short-term and reflect the timing of natural stand development cycles. It would also be consistent with the Watershed Analysis which on page 110 recommends to maximize the current and future benefits derived from RR . . . for cavity nesters and other species dependent upon late-seral stage habitat features.

The two segments of RR within unit 27-1 offer the best opportunity to reserve corridor trees as these are the only portions of the timber sale project requiring an appreciable amount of corridor construction through Riparian Reserve. Reserving a portion of the corridor trees within the RR would help work toward achieving the desired future condition - of a source of coarse woody debris well distributed across the landscape in a manner which meets the needs of species and provides for ecological function. It would also help attain a number of the ACS Objectives - most notably objectives 2, 8 and 9.

Measure 2: Defer regeneration harvest within units 9-1 and 21-3 to reduce the potential for adverse impacts, including cumulative impacts, resulting from the removal of suitable habitat for the spotted owl, marbled murrelet and/or bald eagle. These proposed units total approximately

30 acres.

Rational for Measure 2: Late-seral habitat, including that which has been determined to be suitable for the spotted owl, marbled murrelet and/or bald eagle, is generally lacking in the Dairy-McKay watershed. This is reflected in the analysis completed to assure compliance with the 15% S&G which identified 301 acres or approximately 5% of the Federal forested acres within the watershed currently being in a late successional forest condition, and the Dairy-McKay Watershed Analysis which on page 91 states, "Since habitat loss for species of concern is an important factor in this watershed, it is of increased importance that remaining habitats on federal lands be maintained." Deferring the regeneration harvest of units 9-1 and 21-3 until such a time that additional forest stands within the watershed have developed habitat features of late successional forests would reduce the potential for adverse impacts, including cumulative impacts, resulting from the removal of suitable habitat for the spotted owl, marbled murrelet and/or bald eagle.

While units 7-1 and 27-1 also contain suitable habitat for the spotted owl, marbled murrelet and/or bald eagle, the stand conditions within these units are such that they are proposed for density management treatments rather than regeneration harvest. Thinning within these units is not expected to remove the treated stands from a condition of potentially functioning as suitable habitat. Given the relative low stocking levels and small sizes of units 9-1 and 21-3, density management within these units is not recommended.

3.8.2.2 Expected Impact Review

Measure 1 This measure would increase the amount of CWD within the RR in Unit 27-1.

Special Status/Noxious Weeds: Implementation of this measure is not expected to have any effects on the vegetative resources beyond what is currently analyzed under the proposed action and alternatives.

Forest Management: Retaining appreciable amounts of fresh Douglas fir logs within an area can increase the potential for bark beetle damage to live Douglas firs within the area. The *Dairy-McKay Watershed Analysis* recommends (p. 111) that in a shaded situation, not to leave more than 3 fresh down Douglas-fir trees per acre in order to reduce the potential for bark beetle damage. The potential for impacts can be further reduced by felling the trees to be retained on site no earlier than July and no later than the end of September to avoid beetle breeding and dispersing periods.

As recommended, it is estimated that this additional design feature would result in approximately 3 reserve trees per each of the expected 15 corridors being retained on site for CWD which is roughly equates to about three trees per acre. Therefor, retaining these trees on site as CWD should have only a minimal increase in the potential for bark beetle damage to the residual or surrounding stands of Douglas-fir.

There would be no impact on timber sale volume for the Tillamook Resource Area PSQ (Probable Sale Quantity) as the retained trees would be located within the Riparian Reserve land allocation.

Fish: The recommendation to retain all trees cut in riparian reserve skyline corridors in unit 27-1 for the enhancement of CWD could be beneficial to ACS objectives, however direct benefits to fisheries resources would not occur due to the improbability of any of those trees moving downstream and improving habitat conditions for any fish. The overall effect in this case would not change the impacts any appreciable amount from any of action alternatives and their affect calls.

Soil and Water: Implementation of this measure is not expected to have any effects on the soil and water resources beyond what is currently analyzed under the proposed action and alternatives.

Measure 2 This measure would defer from harvest approximately 36 acres of potentially suitable habitat for the spotted owl, marbled murrelet and/or bald eagle.

Special Status/Noxious Weeds: Implementation of this measure is not expected to have any effects on the vegetative resources beyond what is currently analyzed under the proposed action and alternatives.

Forest Management: There would be an impact of reduced timber sale volume for the Tillamook Resource Area PSQ (Probable Sale Quantity) as the deferred units would not be harvested at this time; this reduction in PSQ is estimated to be approximately 710 MBF. In addition, approximately 36 acres of mixed conifer/hardwood or understocked conifers within the Matrix land allocation would not be treated with a regeneration harvest at this time and subsequently replanted with a fully-stocked, productive conifer plantation.

Fish: The recommendation to defer harvest of portions of section 9-1 and 21-3 as described in alternative 2 would result in approximately 36 acres less harvest within the planning area and the road in T.2N., R.2W., section 21 not being reconstructed or decommissioned after use. This would be a minor reduction in the potential impacts, both in timber acreage and road not decommissioned. The resulting potential impacts would fall between the impacts described in alternative 2 and alternative 3 and the impacts calls would remain the same as these other two alternatives.

Soil and Water: Implementation of this measure is not expected to have any effects on the soil and water resources outside the range of what is currently analyzed under the proposed action and alternatives.

4.0 List of Interdisciplinary Team Members, Preparers and Support Staff

Table 14. List of Interdisciplinary Team Members, Preparers and Support Staff		
NAME	**TITLE**	**RESOURCE**
David Roché	Forester	ID Team Leader/Rural Interface
William Wais	Forester	Silviculture and Forest Management
Cindy Weston	Fisheries Biologist	Fisheries
Matt Walker	Fisheries Biologist	Fisheries
Dennis Worrel	Natural Resource Specialist	Soils & Hydrology
Katrina Symons	NEPA Coordinator/NRSA	NEPA/Cultural Resources
Steve Bahe	Wildlife Biologist	Terrestrial Wildlife
Andy Pampush	Wildlife Biologist	Survey and Manage/Botany
Kurt Heckeroth	Forestry Technician	Botany
Carl Symons	Engineering Technician	Engineering
Tim Livengood	Area Engineer	Engineering
Kent Mortensen	Forestry Technician	Fuels Management
Gregg Kirkpatrick	Outdoor Recreation Planner	VRM/Recreation

5.0 CONSULTATION and PUBLIC INVOLVEMENT

See Chapter 1.6 - Issues and Units of Measure for a discussion of the public involvement process and Chapter 3.7 - Conformance With Land Use Plans, Policies, and Programs for a summary of ESA consultation with NMFS and USFWS.

Appendix 2 of the EA contains the public comments, and BLM responses to those comments, received in response to the initial 30-day scoping comment period for EA OR-086-01-01, the comments and BLM responses to the comments received at the Public Meeting which was held on January 29, 2001, and the comments received from the American Lands Alliance which were received on July 12, 2001 and BLM responses.

6.0 GLOSSARY

ACS - see "Aquatic Conservation Strategy Objectives."

Aquatic Conservation Strategy Objectives - The Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The four components of the Aquatic Conservation Strategy (RR, Key Watersheds, Watershed Analysis, and Watershed Restoration) were developed to meet the nine ACS objectives. (See pp 5-7 of the Salem RMP for a listing of the ACS objectives, or Appendix 9 and 11 of this EA)

Coarse Woody Debris - Tree or portion of a tree that has fallen or was cut and left in the woods to contribute to a variety of ecosystem functions. Usually refers to pieces at least 20 feet long and 20 inches in diameter at the large end.

Commercial thinning - The removal of merchantable trees from an even-aged stand to encourage growth of the remaining trees.

CWD - See "Coarse Woody Debris."

DBH - See "Diameter at Breast Height."

Decommission - To remove [as in a road] from service.

Diameter at Breast Height - The diameter of a tree 4.5 feet above the ground on the uphill side of the tree.

EIS - see "Environmental Impact Statement."

EFH – see "Essential Fish Habitat"

Environmental Analysis - A systematic process of developing reasonable alternatives and predicting the probable environmental consequences of a proposed action and the alternatives.

Environmental Impact Statement - A formal document to be filed with the Environmental Protection Agency that considers significant environmental impacts expected from implementation of a major federal action; a detailed written statement as required by section 102(2)(C) of the [National Environmental Policy] Act, as amended (40 CFR 1508.11).

Essential Fish Habitat - The waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity.

ESU - see "Evolutionarily Significant Unit."

Evolutionarily Significant Unit - A population that is reproductively isolated from other specific populations and represents an important component in the evolutionary legacy of the biological species.

GFMA - See "General Forest Management Area."

General Forest Management Area - A BLM sub-category of the Matrix land allocation as described within the Salem District RMP.

IDT - See "Interdisciplinary Team."

Interdisciplinary Team - A group of environmental experts specializing in a range of disciplines, who conduct the environmental analysis.

LUA - see "Land use allocation."

Land Use Allocation - Allocations which define allowable uses/activities, restricted uses/activities, prohibited uses/activities. They may be expressed in terms of area such as acres or miles, etc. Each allocation is associated with a specific management objective.

LWD - see "Large woody debris."

Large woody debris - Pieces of wood larger than ten feet long and six inches in diameter, in a stream channel.

Matrix - A federal (BLM and USFS) land allocation which is managed to meet several objectives including but not limited to, the production of a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability.

MMBF - Million Board Feet. A board foot is a unit of measure used to quantify commercial lumber; it measures 1 foot x 1 foot x 1 inch.

MBF - Thousand Board Feet**.** A board foot is a unit of measure used to quantify commercial lumber; it measures 1 foot x 1 foot x 1 inch.

MSA – see "Magnuson-Stevens Act"

Magnuson-Stevens Act – Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.). This act requires the identification of EFH for federally managed fishery species and the implementation of measures to conserve and enhance this habitat as described in

Federal fishery management plans. The Pacific Coast Salmon Plan is applicable to the Plentywater Creek Project area.

National Environmental Policy Act - The basic national charter for the protection of the environment. It establishes policy, sets goals (section 101), and provides means (Section 102) for carrying out the policy.

NEPA - See "National Environmental Policy Act."

New road construction - Construction of a road where there previously has not been a road. ie: no indication of an historic road bed (indicators may include: excavation scaring and human caused alteration of the topography; vegetation such as alder growing in or along the old road; indications of a rocked surface or soil compaction; or altered flow of surface water not attributed to natural causes.

O & C Revested Lands - Public lands which where granted to the Oregon and California Railroad Company and subsequently revested to the United States.
Permanent road - Permanent roads are those roads that are used and/or not decommissioned after the contract is terminated.

Regeneration harvest - Timber harvest conducted with the partial objective of opening a forest stand to the point where favored tree species will be reestablished.

Riparian Reserve - A federal (BLM or USFS) land allocation which overlays all other land allocations. The allocation is a key component of the Aquatic Conservation Strategy which was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. Lands within this allocation are located along permanent and intermittent streams where special standards and guidelines direct land use.

Road - A transportation facility originally constructed to be used primarily by vehicles having four or more wheels. It is documented as such by the owner, and [may be] maintained for regular and continuous use (CFR 9100). The level of maintenance is generally dependent on available funding.

Road Construction - see "New road construction."

Reconstruction (Road) - Work done, in varying amounts, to an existing road (bed) which restores it to a condition that meets present need and construction standard. Reconstruction may incorporate some of the following: brushing, clearing and grubbing, excavation, widening, rocking, blading, subgrade compaction, ditching, culvert placement or replacement, waterdips, stabilization & erosion prevention methods.

RR - see "Riparian Reserve"

Semi-permanent road **-** Semi-permanent roads are those roads that used for longer than one dry season but are decommissioned by the end on the contract.

Soil compaction - The increase in soil density (reduction of total porosity) that results from the rearrangement of soil particles in response to applied external forces such as traffic by heavy machinery.

Soil disturbance - Any disturbance that alters the physical, chemical, or biological properties of the soil. The most common ways by which forest management activities physically disturbs soils are from compaction, rutting, forest floor displacement and mixing, and prescribed burning.

Soil displacement - The mechanical movement of the upper organic and mineral surface by equipment and movement of logs. It involves excavation, scalping, exposure of mineral soil and burial.

S & M **-** see "Survey and Manage."

Snag - Any standing dead, partially dead, or defective (cull) tree at least 10 inches in diameter at breast height (DBH), although it usually refers to trees and at least 15 inches at DBH and at least 20 feet tall. A hard snag is composed primarily of sound wood. A soft snag is composed primarily of wood in advanced stages of decay and deterioration, generally not merchantable.

Survey and Manage – A Mitigation measure adopted as a standard and guideline within the Northwest Forest Plan Record of Decision and replaced with these standards [Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines] and guidelines that is intended to mitigate impacts of land management efforts on those species that are closely associated with late-successional or old-growth forests whose long-term persistence is a concern. These measures apply to all land allocations and require land managers to take certain action relative to species of plants and animals, particularly some amphibians, bryophytes, lichens, mollusks, vascular plants, fungi, and arthropods, which are rare or about which little is known. These actions include; (1) manage known sites; (2) survey prior to ground-disturbing activities; (3) conduct extensive and general regional (strategic) surveys.

Take - For animals, "The term 'take' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct." (Section 3, ESA)

Temporary road - Temporary roads are those roads which are built, used and decommissioned during the same dry season (usually June 15 to October 15).

TMDL **-** See "Total Maximum Daily Load."

Total Maximum Daily Load - Total Maximum Daily Load is the total amount of a pollutant that can enter a waterbody without violating water quality standards.

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